



STATE OF NORTH CAROLINA  
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE  
GOVERNOR

EUGENE A. CONTI, JR.  
SECRETARY

December 22, 2010

U. S. Army Corps of Engineers  
Regulatory Field Office  
151 Patton Avenue, Room 208  
Asheville, NC 28801-5006

ATTN: Ms. Sarah Hair  
NCDOT Coordinator

Dear Madam:

Subject: **Revision to Permit Application for an Individual Section 404 and Section 401 Water Quality Certification** for the widening of NC 49 from East of NC 73 to East of SR 2630 (Cline Road) in Cabarrus County. Federal Aid Project No. NHS-0049(26), Division 10, TIP No. R-2533CC.

Reference: Individual Permit Application dated September 7, 2010

Please see attached, revised permit drawings and roadway drawings. Revisions to the following drawings are a result of comments received from NCDWQ on November 8, 2010 (see attached e-mail). Revisions have been made to drawings at Site 1 (Permit Drawing Sheets 11, 12, 13 and Roadway Sheets 2-Y and 6), Site 4 (Permit Drawing Sheets 20 and 21), Site 6 (Permit Drawing Sheets 23, 24, 35 and 36), the detail sheet (Permit Drawing Sheet 9, Roadway Sheet 2-J) and the overview sheets of Sites 4 – 9 (Permit Drawing Sheets 18, 19 and Roadway Sheet 11). The revisions in these drawings address the change in size of rip-rap at the outfall of these culverts comprised of two or more barrels from Class "I" to Class "II".


A further revision occurs at Site 4 (Permit Drawing Sheets 18, 20, 21 and Roadway Sheet 11). This revision involves the outfall of a stream into the Site 4 stream. The original design called for the piped Site 7 stream to enter the Site 4 stream at the headwall of the first culvert. A design change calls for the piped Site 7 stream to enter the Site 4 stream approximately 10 feet (3 meters) inside of the first culvert. This design change will help to dissipate flow from the Site 7 stream better than the previous design.

An additional revision has occurred to the permit summary sheet (Permit Drawing Sheet 6). An error has been discovered in the conversion of the metric impact numbers and the English impact numbers. This has resulted in the decrease of 19 linear feet of permanent stream impact due to the 2 @ 2.7 x 2.7 RCBC at Site 6. The bank stabilization at Site 6 has increased by 17 linear feet. The overall permanent stream impacts for R-2533CC is now 3058 linear feet, a decrease of

2 linear feet from the original permit application. These changes affect only the English version of the Permit Summary Sheet and do not change the metric version. No new areas or impacts are included in this revision.

Attached with this letter you will find the following revised sheets: Permit Drawings 6, 9,11,12,13,18,19,20,21,23,24,35 and 36. Roadway Drawings 2-J, 2-Y, 6, and 11.

Thank you for your assistance with this project. If you have any questions or need additional information, please contact Mr. Jason Dilday at [jldilday@ncdot.gov](mailto:jldilday@ncdot.gov) or (919) 413-6693.

Sincerely,  
  
Gregory J. Thorpe, Ph.D., Environmental Management Director  
Project Development and Environmental Analysis Branch

W/attachment

Mr. Brian Wrenn, NCDWQ (5 Copies)  
Ms. Marella Buncick, USFWS  
Ms. Marla Chambers, NCWRC  
Ms. Jennifer Derby, USEPA

W/o attachment (see website for attachments)

Dr. David Chang, P.E., Hydraulics  
Mr. Greg Perfetti, P.E., Structure Design  
Mr. Dewayne Sykes, P.E., Utilities Unit  
Mr. Mark Staley, Roadside Environmental  
Mr. Barry Moose, PE (Div. 10), Division Engineer  
Mr. Larry Thompson (Div. 10), DEO  
Mr. Jay Bennett, P.E., Roadway Design  
Mr. Majed Alghandour, P. E., Programming and TIP  
Mr. Art McMillan, P.E., Highway Design  
Mr. Scott McLendon, USACE, Wilmington  
Ms. Beth Harmon, EEP  
Mr. Phillip Ayscue, NCDOT External Audit Branch  
Mr. Drew Joyner, PE, Human Environment Unit Head  
Mr. Clarence W. Coleman, P.E., FHWA  
Mr. John Conforti, REM, PDEA Project Development Group Supervisor

## Dilday, Jason L

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**From:** Lespinasse, Polly  
**Sent:** Monday, November 08, 2010 10:27 AM  
**To:** Dilday, Jason L  
**Cc:** Hair, Sarah E SAW  
**Subject:** NC 49

Jason,

I have completed the review of the new application for NC 49 in Cabarrus. I have a couple of comments/concerns. They are:

- Some of the permit sheets refer to “ditch notes”, specifically ditch notes “1”, “7” and “8”. I could not locate these “notes” on the drawings. Can you please let me know where they are or provide them if they were not included.
- Permit Site 5 – It appears that this stream will be relocated to a culvert (upper reach) and then to a ditch (lower reach). If the upper reach will be piped, how is the stream going to get into the pipe? The plans show the stream (depicted as impacted) with the culvert parallel to it, but I don’t see a spring box or other mechanism to get the stream into the pipe. Please clarify.
- I have a comment about riprap – it appears that Class I is proposed for most of the ditch outfalls and for bank stabilization. I would recommend the use of larger riprap on those sites that consist of more than a single barrel culvert. Example: Site 8 is a small intermittent stream and Class I is proposed for bank stabilization. That seems to make sense. Site 5 (outlet channel – Detail 23) proposes Class I riprap and it’s a double barrel culvert conveying a perennial stream. This is a little more confusing to me. Seems like with the larger streams, there is more opportunity for the riprap to move into the stream, at which point it will typically have to be manually removed.

If you have any questions or need clarification, please let me know.

Thanks.

Polly Lespinasse - [Polly.Lespinasse@ncdenr.gov](mailto:Polly.Lespinasse@ncdenr.gov)  
Environmental Specialist  
North Carolina Dept. of Environment & Natural Resources  
Div. of Water Quality  
610 E. Center Ave., Suite 301  
Mooresville, NC 28115  
Ph: 704.663.1699 Fax: 704.663.6040

E-mail correspondence to and from this address may be subject to the North Carolina Public Records Law and may be disclosed to third parties.

**WETLAND PERMIT IMPACT SUMMARY**

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS					SURFACE WATER IMPACTS					
			Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)	
1 *	200+17/201+21-L-REV	3@3.7 x 3.7 RCBC Bank Stabilization	0.025						0.11	0.07	108	125	
		UT Channel Relocation							0.01		36		
2	212+13/212+79 -L-REV	1@11.0 x 2.7 BOTTOMLESS RCBC							0.01	0.12	46	184	
		Bank Stabilization									39		
3 *	213+52/214+02 -L-REV	Roadway Fill	0.200										
									0.09	0.01	361	39	
4	218+26/219+34 -L-REV	2@2.7 x 2.7 RCBC											
	Shopping Center Access	2@2.7 x 2.7 RCBC									46		
		Bank Stabilization							0.06		837		
5 *	9+90/12+47 -Y1-REV RT	1050mm RCP	0.089								10		
		Bank Stabilization							0.09	0.02	371	89	
6	11+87/12+70 -Y1-REV	2@2.7 x 2.7 RCBC											
	12+11.6 -Y16-REV	2@2.7 x 2.7 RCBC											
		Bank Stabilization							0.13	0.01	902	43	
7	219+45/219+59 -L-REV	1 @ 1650mm RCP											
		1 @ 1800mm RCP											
									<0.01		10		
8	11+06-Y16REV-RT	600 RCP									10		
		Bank Stabilization											
									0.02		118		
9	220+00/220+28 -L-REV LT	450mm RCP											
<b>TOTALS:</b>			0.31						0.52	0.23	3058	480	

**ENGLISH IMPACTS**

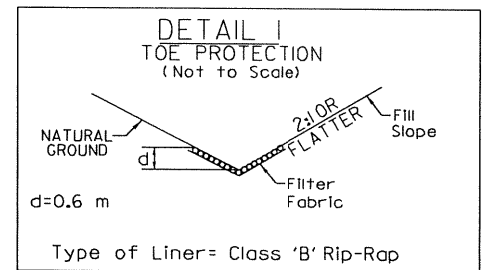
\* WETLAND CONSIDERED TOTAL TAKE.

Permit Drawing  
Sheet 6 of 51  
Revised 12/13/10

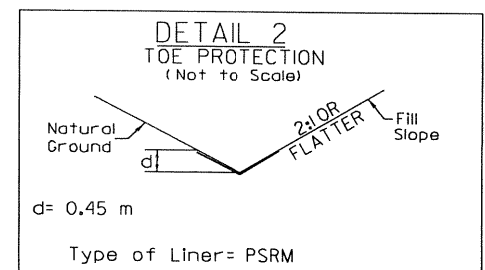
NC DEPARTMENT OF TRANSPORTATION  
DIVISION OF HIGHWAYS  
CABARRUS COUNTY  
WBS - 34448.1.1 (R-2533CC)

SHEET

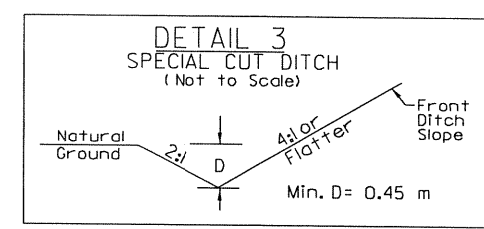
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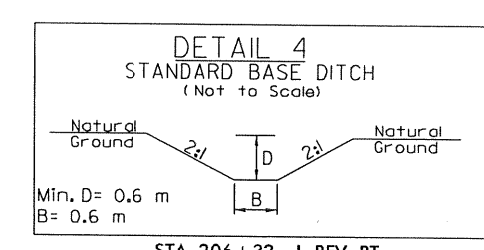
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FROM STA. 233+30 TO STA. 234+30 -L-REV LT



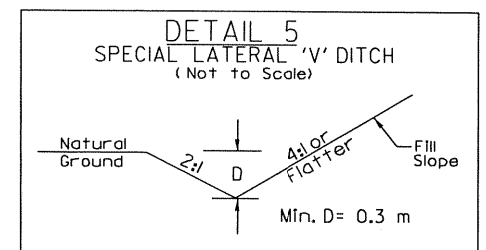
FROM STA. 202+40 TO STA. 202+60 -L-REV LT  
FROM STA. 204+25 TO STA. 204+80 -L-REV LT



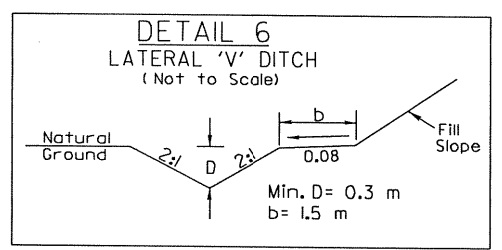
FROM STA. 204+98 TO STA. 206+60 -L-REV LT  
FROM STA. 206+00 TO STA. 206+28 -L-REV RT  
FROM STA. 206+80 TO STA. 207+81 -L-REV LT  
FROM STA. 9+85 TO STA. 10+72 -SERI- LT



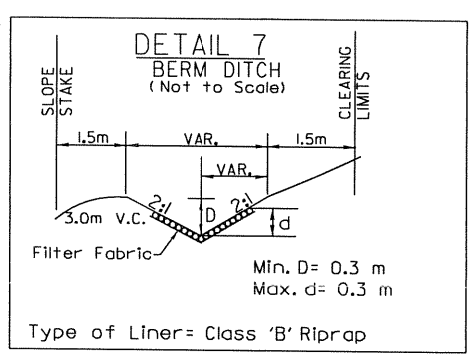
STA. 206+32 -L-REV RT  
STA. 207+66 -L-REV RT



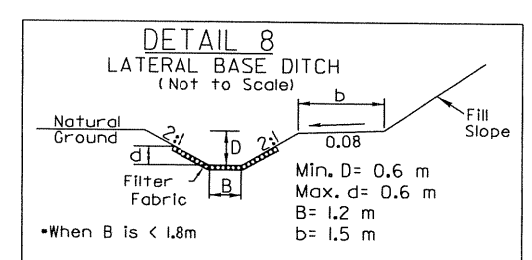
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FROM STA. 228+60 TO STA. 229+40 -L-REV LT  
FROM STA. 16+40 TO STA. 17+00 -Y1-REV RT  
FROM STA. 5+50 TO STA. 6+16 RAMP A LT  
FROM STA. 0+45 TO STA. 1+20 LOOP D RT



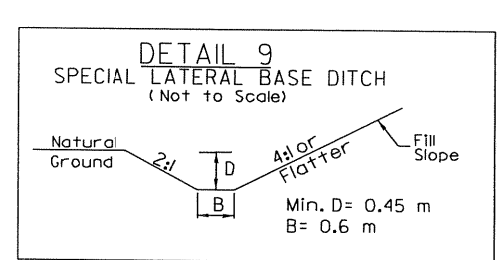
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FROM STA. 228+13 TO STA. 228+60 -L-REV LT  
FROM STA. 11+19 TO STA. 11+40 -SERI- LT



FROM STA. 211+60 TO STA. 211+95 -L-REV RT  
FROM STA. 3+40 TO STA. 3+60 RAMP B LT

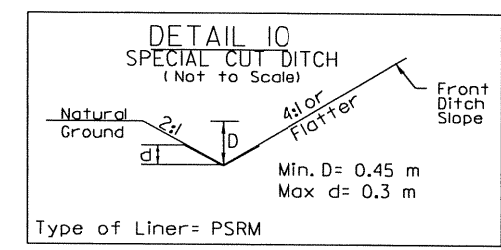


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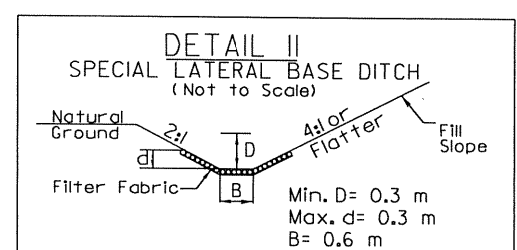


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FROM STA. 218+20 TO STA. 219+00 -L-REV LT

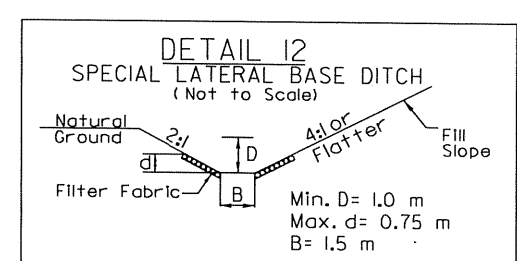
Permit Drawing  
Sheet 9 of 51  
Revised 12/13/10



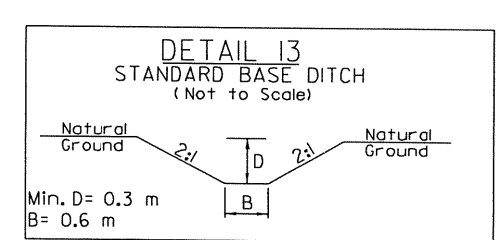
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FROM STA. 214+00 TO STA. 214+60 -L-REV LT  
FROM STA. 16+53 TO STA. 18+00 -Y1-REV LT  
FROM STA. 10+05 TO STA. 10+86 -Y14-REV RT  
FROM STA. 11+40 TO STA. 11+83 -Y15-REV LT  
FROM STA. 11+60 TO STA. 11+84 -Y15-REV RT



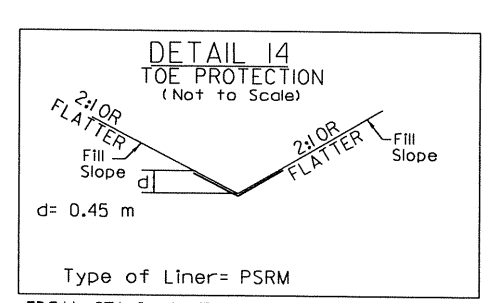
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FROM STA. 3+60 TO STA. 4+30 -RAMP B- LT



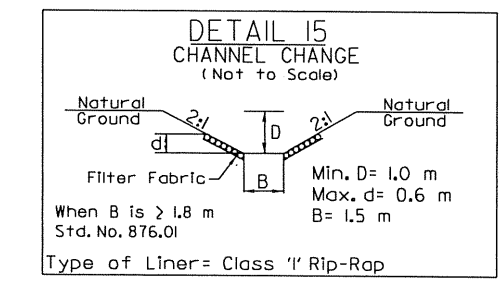
FROM STA. 219+80 TO STA. 221+00 -L-REV RT



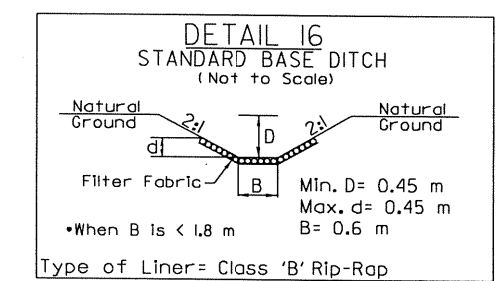
FROM STA. 221+80 TO STA. 222+15 -L-REV LT  
FROM STA. 222+74 TO STA. 222+85 -L-REV LT  
STA. 3+40 RAMP A LT  
STA. 2+40 RAMP B RT  
STA. 12+07 -Y14- LT



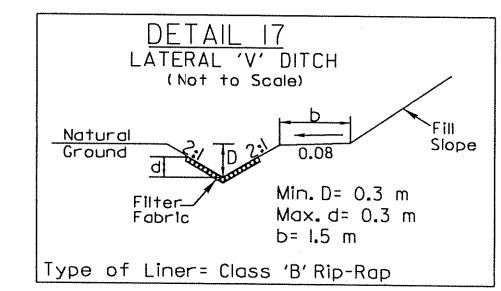
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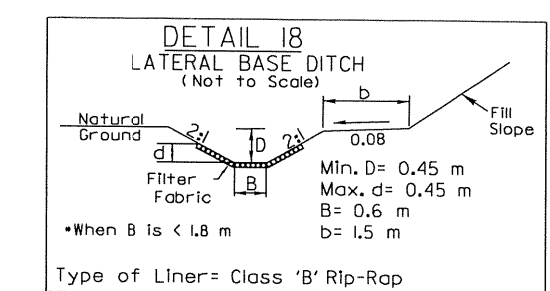
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FROM STA. 223+36 TO STA. 224+07 -L-REV RT



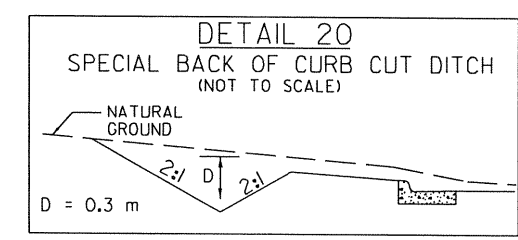
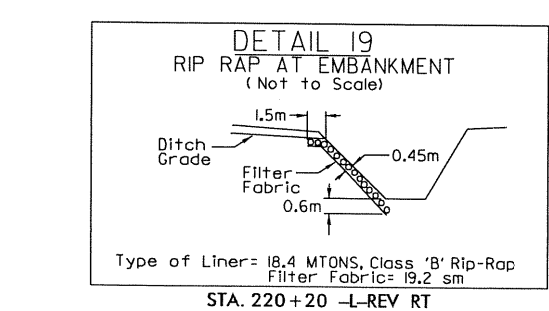
STA. 224+00 -L-REV RT  
STA. 18+50 -Y1-REV RT  
STA. 18+60 -Y1-REV LT



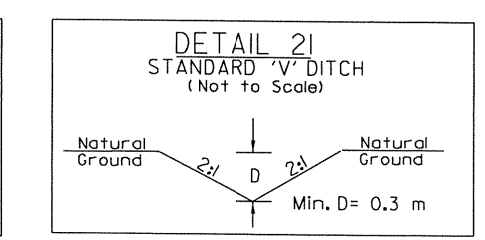
FROM STA. 5+64 TO STA. 5+96 RAMP A RT



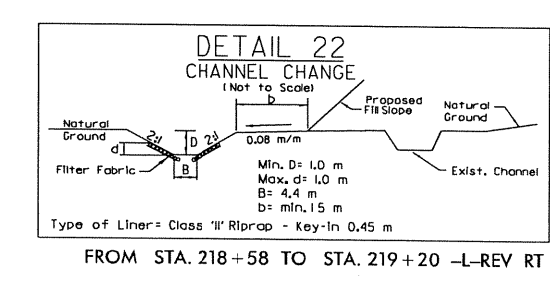
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FROM STA. 219+00 TO STA. 219+45 -L-REV LT  
FROM STA. 233+71 TO STA. 233+97 -L-REV RT  
FROM STA. 11+55 TO STA. 12+10 -Y1-REV LT  
FROM STA. 6+03 TO STA. 6+45 -RAMP A- RT



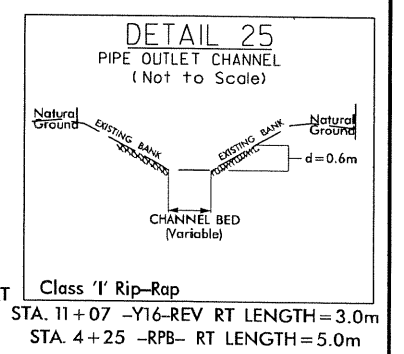
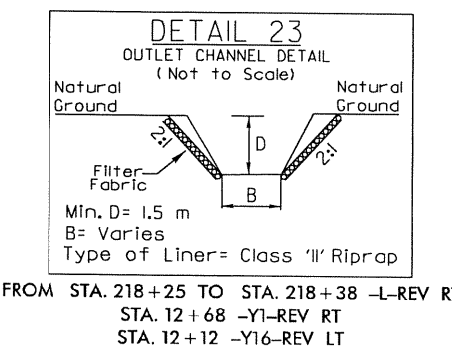
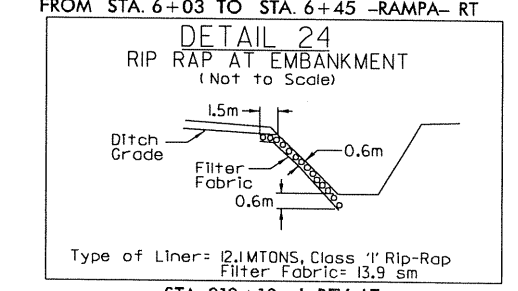
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FROM STA. 232+30 TO STA. 232+50 -L-REV LT  
FROM STA. 232+60 TO STA. 233+04 -L-REV LT



FROM STA. 11+60 TO STA. 11+80 -Y16-REV LT  
STA. 11+00 -Y2-REV RT




FROM STA. 218+58 TO STA. 219+20 -L-REV RT

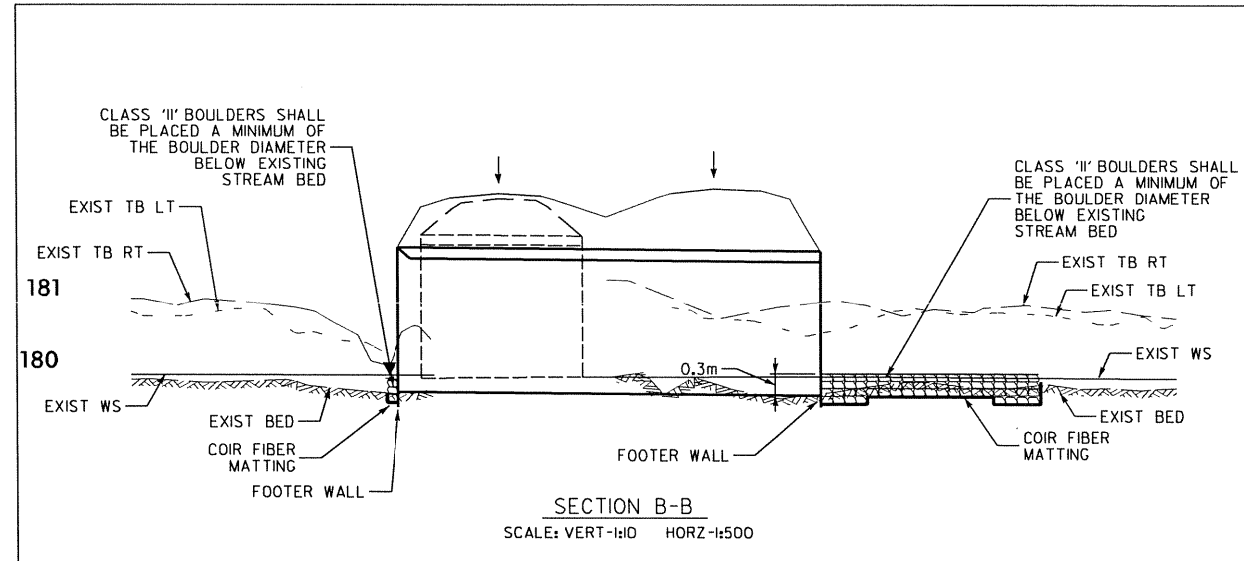
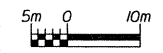


DATE: 10/20/10 USER: JACQUES BOU, 4/27/10

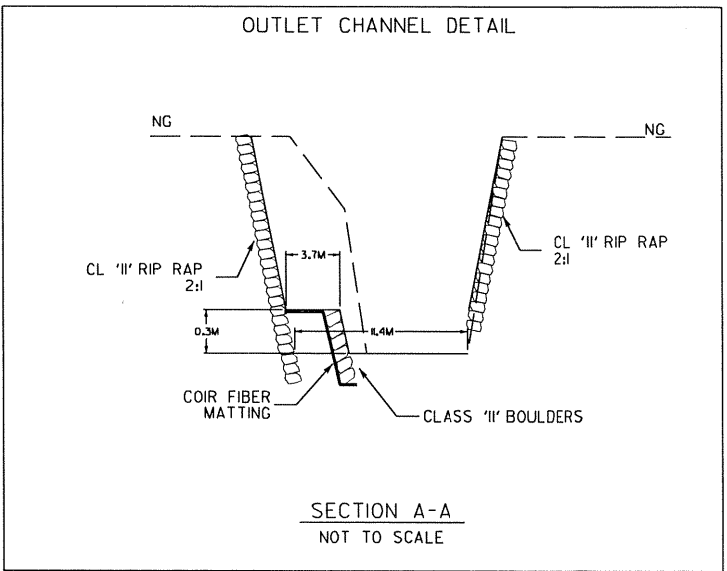
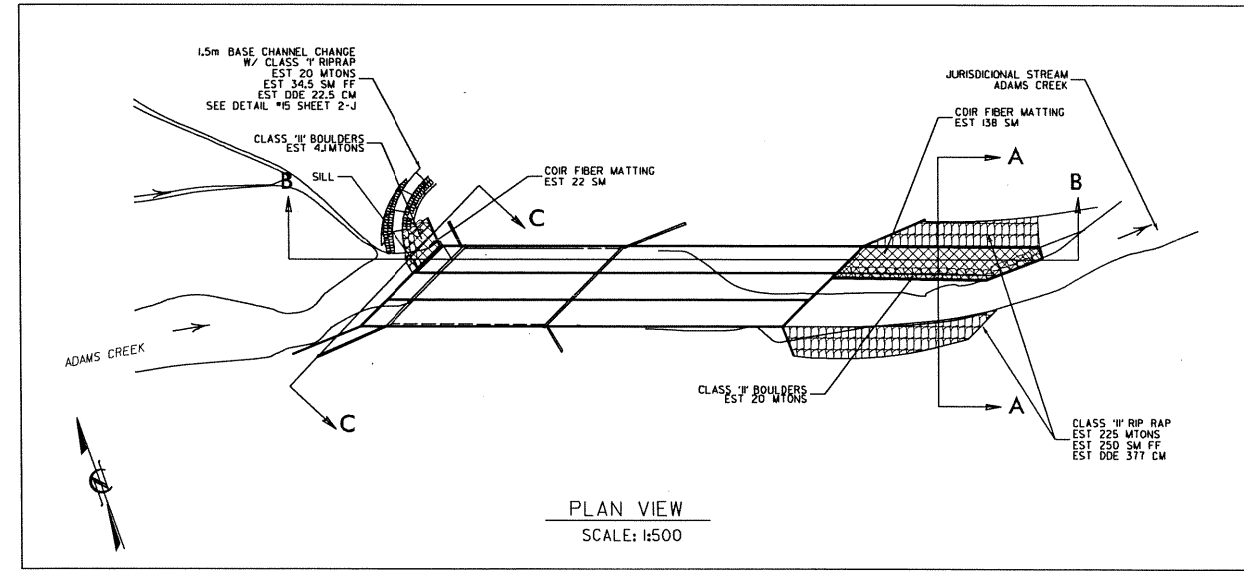
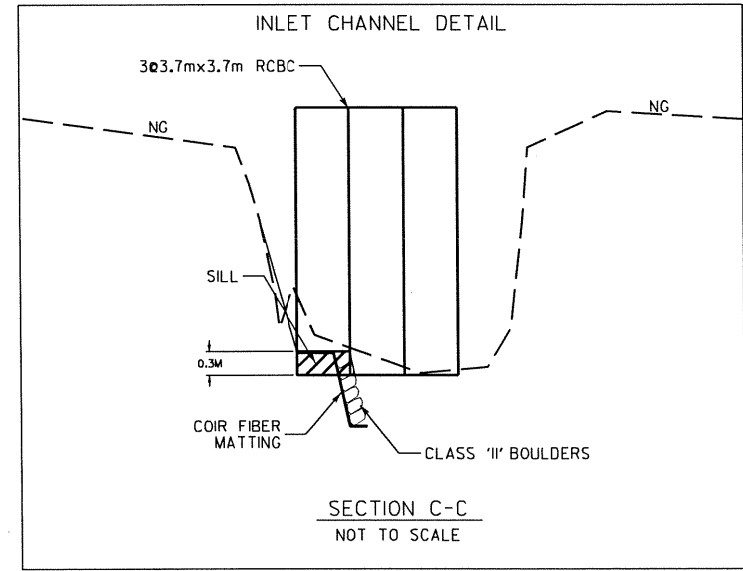
# CHANNEL BENCH DETAIL SHEET

Permit Drawing  
Sheet 11 of 61  
Revised 12/13/10

	PROJ. REFERENCE NO. R-2533CC	SHEET NO. 2-Y
	HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION		
Prepared in the Office of: <b>AECOM</b> <small>NC FIRM LICENSE No. F-0342 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607 (919) 854-6200 • (919) 854-6259 (FAX)</small>		
CONST. REV.		
R/W REV.		



- NOTES:
- A BENCH 0.3m ABOVE THE BED SHALL BE ARMORED WITH BOULDERS AS SHOWN ON THE PLAN VIEW. THE DEPTH OF ARMOR PROTECTION SHOULD EXTEND 0.45m BELOW THE STREAM BED AND LINED WITH COIR FIBER MATTING.
  - DIMENSIONS AND SLOPES MAY BE ADJUSTED TO FIT BY THE ENGINEER.
  - EDGE ARMOR CAN BE NATURAL STREAM BOULDERS OR EXTRACTED FROM CLASS II RIPRAP OR SHOT ROCK MATERIAL AND CAN BE CUBICAL OR RECTANGULAR IN NATURE.
  - ACCEPTABLE BOULDERS FOR THE EDGE ARMOR SHALL HAVE THE FOLLOWING APPROXIMATE DIMENSIONS; 0.9m x 0.6m x 0.3m. UNSUITABLE EDGE ARMOR MATERIAL THAT REMAINS FROM CLASS II RIP RAP OR SHOT ROCK STORES, MAY BE USED IN BACK FILL OF THE OVER BANK AREA OR DISCARDED.
  - COIR FIBER MATTING SHALL EXTEND FROM THE BOTTOM OF THE FOOTER BOULDERS AND ACROSS THE BENCHED AREA TO PREVENT WASHOUT OF SEDIMENT THROUGH BOULDER GAPS.



## STA. 200+37 TO STA. 200+98 -L-REV



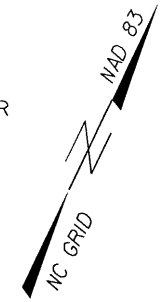
PROJ. REFERENCE NO. R-2533CC	SHEET NO. 6
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
Prepared in the Office of:	
<b>AECOM</b>	
<small>NC FIRM LICENSE No. F-0342 101 Corporate Center, Drive, Suite 475 Raleigh, NC 27601 (919) 854-6200 • (919) 854-6259(FAX)</small>	



CONST. REV.  
R/W REV.

- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND

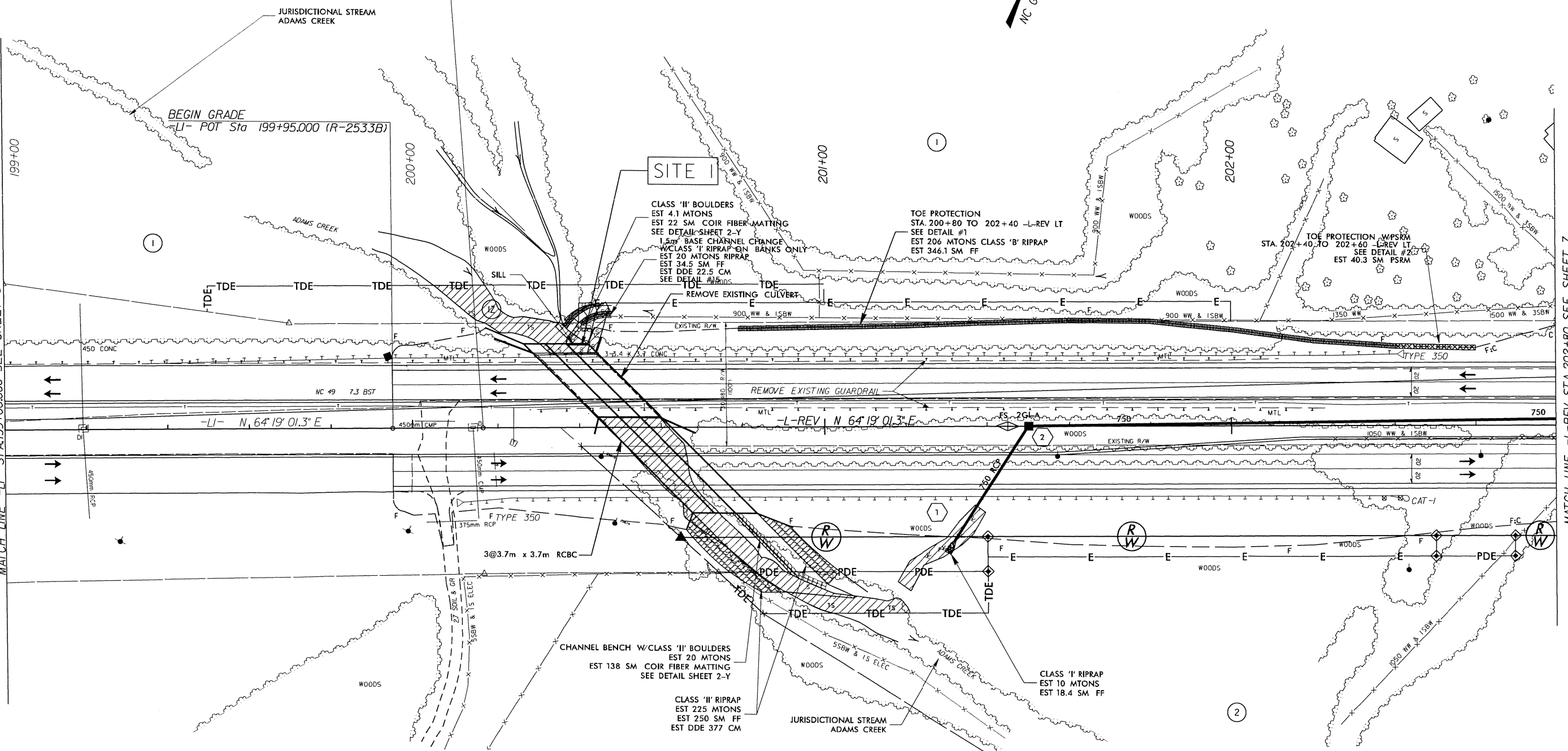
Permit Drawing  
Sheet 12 of 51  
Revised 12/13/10



R/W REV. 3) ADDED PDE TO PARCEL FOR DRAINAGE REV. 05/07/09  
 1) REVISED OWNER NAME PARCEL 2 JMK 10/15/03  
 2) REVISED OWNER NAME PARCEL 2 KJV 7/18/04  
 4) REMOVED PDE & ADDED TDE TO PARCEL 1  
 5) REVISED TDE ON PARCEL 1 TO ELIMINATE OVERLAP OF TDE AND CORRECTED LABELS ON PDE AND TDE ON PARCEL 2 CMR 05/05/10  
 MATCH LINE -LI- STA. 199+00.000 SEE SHEET 5  
 MATCH LINE -L-REV STA. 202+80 SEE SHEET 7

BEGIN T.I.P. PROJECT R-2533CC  
 -L-REV POT Sta 200+16.400 L.A.=  
 -LI- POT Sta 200+17.273 L.B. (R-2533B)

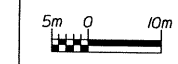
BEGIN GRADE  
 -LI- POT Sta 199+95.000 (R-2533B)



FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-  
 FOR -LI-/-L-REV PROFILE, SEE SHEETS 20 & 21  
 FOR -X-OVER- DETAILS, SEE SHEET 2-M  
 FOR DITCH DETAILS, SEE SHEET 2-J  
 NOTE: ALL DRIVEWAY RADII ARE 3.0m UNLESS OTHERWISE SHOWN.



PROJ. REFERENCE NO. R-2533CC	SHEET NO. 6
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	

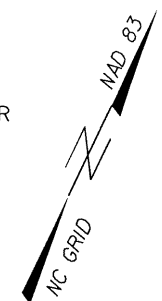


CONST. REV.  
R/W REV.

Prepared in the Office of:  
**AECOM**  
NC FIRM LICENSE NO. F-0342  
701 Corporate Center Drive, Suite 475  
Raleigh, NC 27607  
(919) 854-6200 • (919) 854-6259(FAX)

- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND

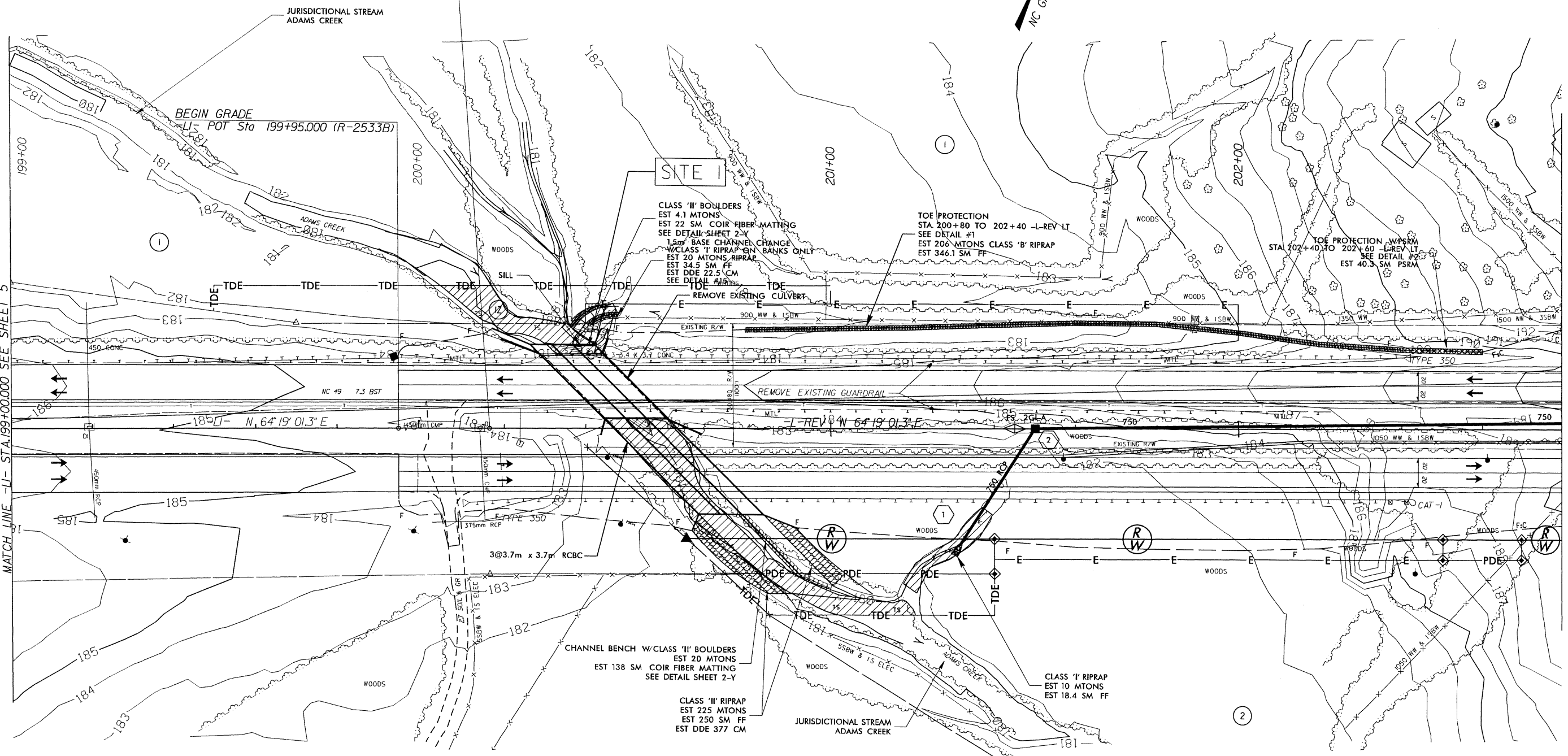
Format Drawing  
Sheet 13 of 31  
Revised 12/13/10



BEGIN T.J.P. PROJECT R-2533CC  
-L-REV POT Sta 200+16.400 L.A.=  
-LI- POT Sta 200+17.273 L.B.(R-2533B)

BEGIN GRADE  
LI- POT Sta 199+95.000 (R-2533B)

R/W REV.  
 1) REVISED OWNER NAME PARCEL 2 JMKD 10/15/03  
 2) REVISED OWNER NAME PARCEL 2 K.V. 7/8/04  
 3) ADDED PDE TO PARCEL 1 FOR DRAINAGE REV. 05/07/09  
 4) REMOVED PDE & ADDED TDE TO PARCEL 1 FOR EROSION CONTROL CMR 07/20/09  
 5) REVISED TDE ON PARCEL 1 TO ELIMINATE OVERLAP OF TDE AND CORRECTED LABELS ON PDE AND TDE ON PARCEL 2 CMR 05/05/10



MATCH LINE -LI- STA. 199+00.000 SEE SHEET 5

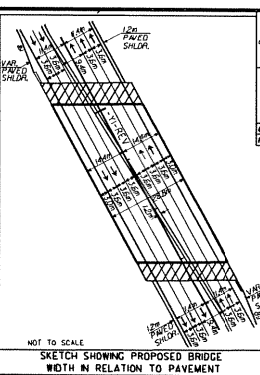
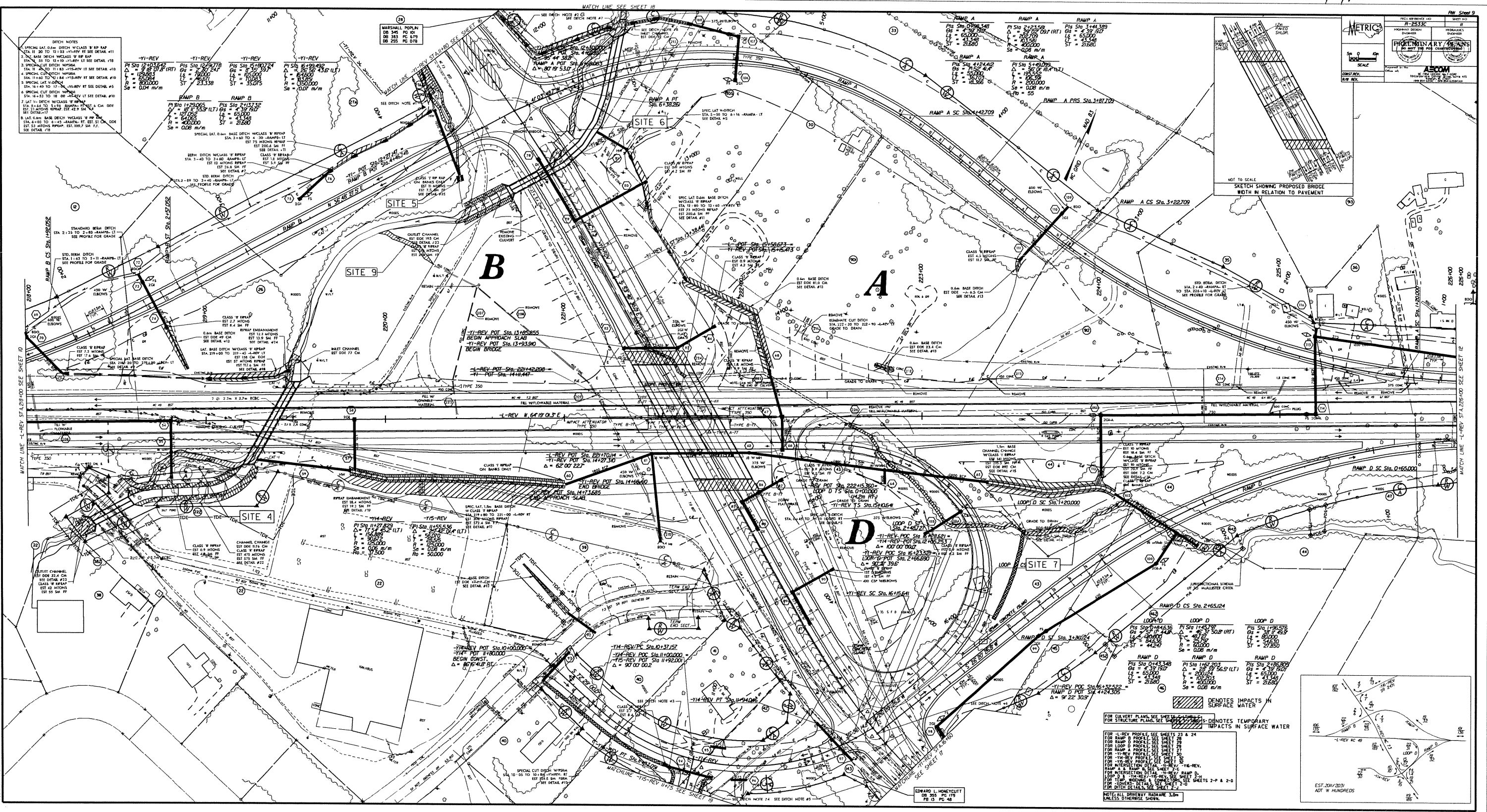
MATCH LINE -L-REV STA. 202+80 SEE SHEET 7

FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-  
 FOR -LI-/-L-REV PROFILE, SEE SHEETS 20 & 21  
 FOR -XOVER- DETAILS, SEE SHEET 2-M  
 FOR DITCH DETAILS, SEE SHEET 2-J  
 NOTE: ALL DRIVEWAY RADII ARE 3.0m UNLESS OTHERWISE SHOWN.

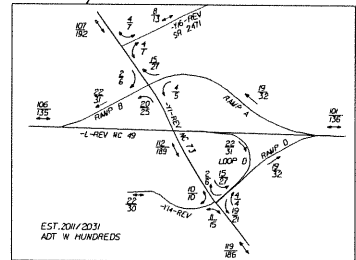
DATE: \*\*DATE\*\*  
 USER: \*\*USER\*\*  
 DGN: \*\*DGN\*\*  
 TIME: \*\*TIME\*\*



METRICS  
 SCALE  
 PRELIMINARY DESIGN  
 AECOM  
 PROJECT NO. 100-100000000-010  
 SHEET NO. 18 OF 31

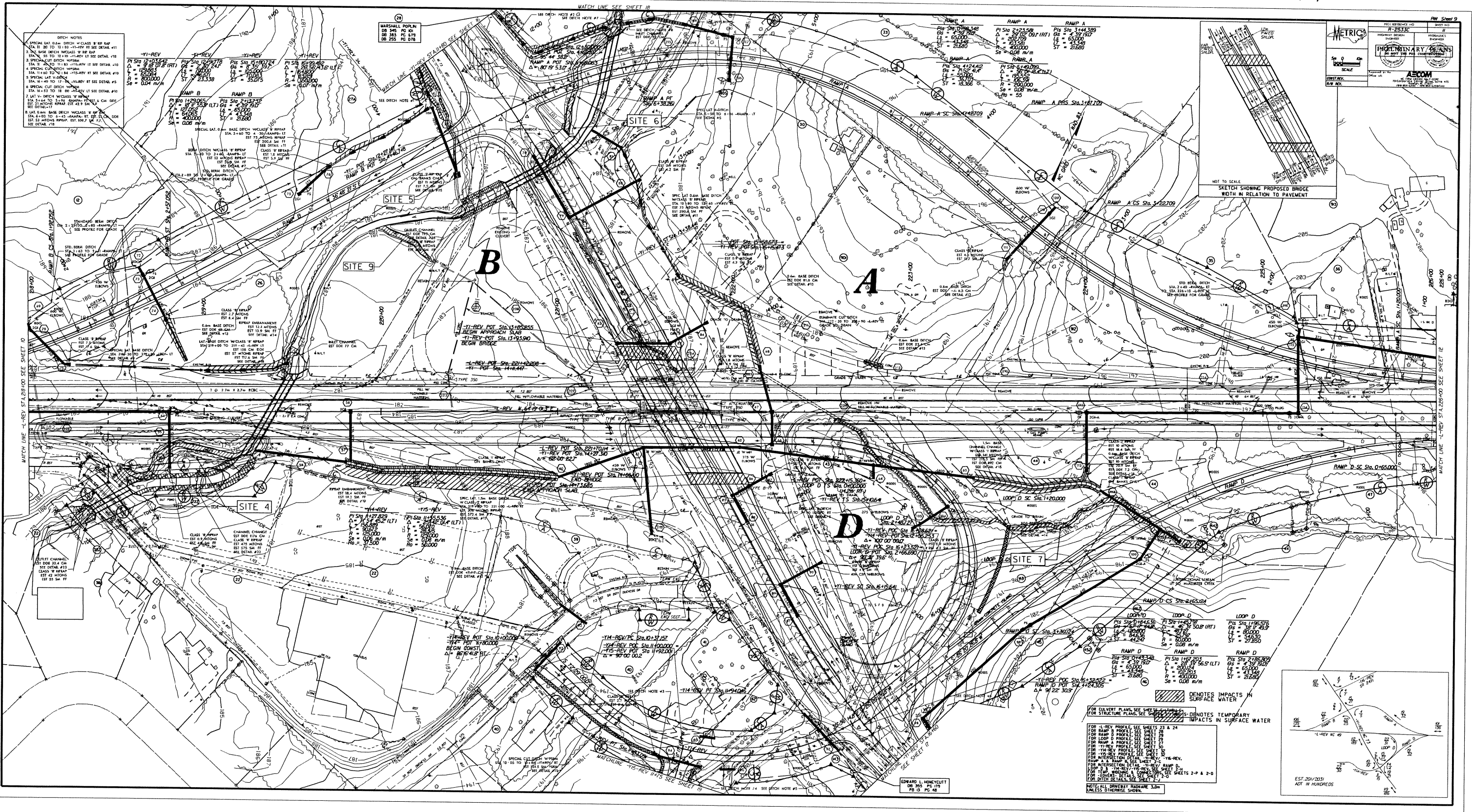


LOOP D	LOOP D	LOOP D
PI STA 1+181.709 LS = 60.000 E = 100.000 ST = 27.850	PI STA 1+181.709 LS = 60.000 E = 100.000 ST = 27.850	PI STA 1+181.709 LS = 60.000 E = 100.000 ST = 27.850
RAMP D PI STA 0+143.348 LS = 60.000 E = 100.000 ST = 27.850	PI STA 1+181.709 LS = 60.000 E = 100.000 ST = 27.850	PI STA 1+181.709 LS = 60.000 E = 100.000 ST = 27.850



FOR CURVE PLANS, SEE SHEETS 23 & 24  
 FOR RAMP B PROFILE, SEE SHEET 24  
 FOR RAMP C PROFILE, SEE SHEET 24  
 FOR RAMP D PROFILE, SEE SHEET 24  
 FOR INTERSECTION PROFILE, SEE SHEET 24  
 FOR ALL OTHER PROFILES, SEE SHEETS 23 & 24  
 FOR OTHER DETAILS, SEE SHEETS 23 & 24

EDWARD L. HONEYCUTT  
 DR. 253 PG. 18  
 PG. 18 PG. 48



**DITCH NOTES**  
 1. SPECIAL LAT. BANK DITCH - CLASS B RR RAP  
 STA. 18+20 TO 18+30 -11-REV-11 SEE DETAIL #11  
 2. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+30 TO 18+35 -11-REV-11 SEE DETAIL #11  
 3. SPECIAL CUT DITCH W/CLASS B RR RAP  
 STA. 18+35 TO 18+40 -11-REV-11 SEE DETAIL #11  
 4. SPECIAL CUT DITCH W/CLASS B RR RAP  
 STA. 18+40 TO 18+45 -11-REV-11 SEE DETAIL #11  
 5. SPECIAL LAT. BANK DITCH  
 STA. 18+45 TO 18+50 -11-REV-11 SEE DETAIL #11  
 6. SPECIAL CUT DITCH W/CLASS B RR RAP  
 STA. 18+50 TO 18+55 -11-REV-11 SEE DETAIL #11  
 7. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+55 TO 18+60 -11-REV-11 SEE DETAIL #11  
 8. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+60 TO 18+65 -11-REV-11 SEE DETAIL #11  
 9. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+65 TO 18+70 -11-REV-11 SEE DETAIL #11  
 10. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+70 TO 18+75 -11-REV-11 SEE DETAIL #11  
 11. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+75 TO 18+80 -11-REV-11 SEE DETAIL #11  
 12. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+80 TO 18+85 -11-REV-11 SEE DETAIL #11  
 13. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+85 TO 18+90 -11-REV-11 SEE DETAIL #11  
 14. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+90 TO 18+95 -11-REV-11 SEE DETAIL #11  
 15. LAT. BANK DITCH W/CLASS B RR RAP  
 STA. 18+95 TO 19+00 -11-REV-11 SEE DETAIL #11

**RAMP A**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**RAMP B**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**RAMP C**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**RAMP D**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP A**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP B**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP C**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP D**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP E**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP F**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP G**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP H**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP I**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP J**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP K**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

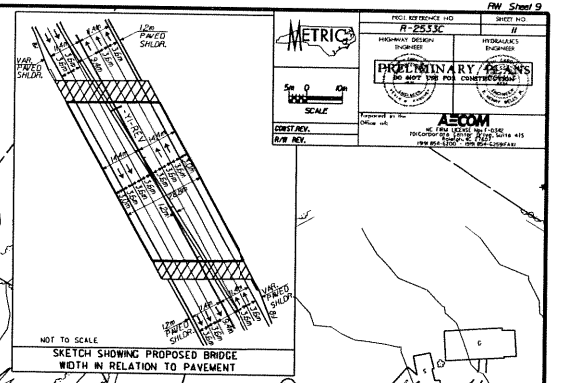
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 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP M**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP N**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

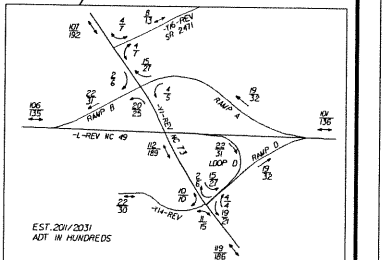
**LOOP O**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M

**LOOP P**  
 PI STA 1124.00  
 Δ = 90° 00' 00"  
 LI = 65.000  
 R = 200.000  
 ST = 21.500  
 S<sub>c</sub> = 0.00 R/W/M



**LEGEND**  
 [Symbol] DENOTES IMPACTS IN SURFACE WATER  
 [Symbol] DENOTES TEMPORARY IMPACTS IN SURFACE WATER

FOR RAMP A PROFILE, SEE SHEET 23 & 24  
 FOR RAMP B PROFILE, SEE SHEET 25  
 FOR RAMP C PROFILE, SEE SHEET 26  
 FOR RAMP D PROFILE, SEE SHEET 27  
 FOR LOOP A PROFILE, SEE SHEET 28  
 FOR LOOP B PROFILE, SEE SHEET 29  
 FOR LOOP C PROFILE, SEE SHEET 30  
 FOR LOOP D PROFILE, SEE SHEET 31  
 FOR LOOP E PROFILE, SEE SHEET 32  
 FOR LOOP F PROFILE, SEE SHEET 33  
 FOR LOOP G PROFILE, SEE SHEET 34  
 FOR LOOP H PROFILE, SEE SHEET 35  
 FOR LOOP I PROFILE, SEE SHEET 36  
 FOR LOOP J PROFILE, SEE SHEET 37  
 FOR LOOP K PROFILE, SEE SHEET 38  
 FOR LOOP L PROFILE, SEE SHEET 39  
 FOR LOOP M PROFILE, SEE SHEET 40  
 FOR LOOP N PROFILE, SEE SHEET 41  
 FOR LOOP O PROFILE, SEE SHEET 42  
 FOR LOOP P PROFILE, SEE SHEET 43  
 FOR LOOP Q PROFILE, SEE SHEET 44  
 FOR LOOP R PROFILE, SEE SHEET 45  
 FOR LOOP S PROFILE, SEE SHEET 46  
 FOR LOOP T PROFILE, SEE SHEET 47  
 FOR LOOP U PROFILE, SEE SHEET 48  
 FOR LOOP V PROFILE, SEE SHEET 49  
 FOR LOOP W PROFILE, SEE SHEET 50  
 FOR LOOP X PROFILE, SEE SHEET 51  
 FOR LOOP Y PROFILE, SEE SHEET 52  
 FOR LOOP Z PROFILE, SEE SHEET 53



DATE: 12/13/10  
 DRAWN BY: [Name]  
 CHECKED BY: [Name]  
 DESIGNED BY: [Name]  
 PROJECT NO: [Number]

EST. 2011/2011  
 AOT IN HUNDREDS

70

PROJ. REFERENCE NO. R-2533CC SHEET NO.

HIGHWAY DESIGN ENGINEER HYDRAULICS ENGINEER

# SHEET 11

# BLOW UP

Permit Drawing Sheet 20 of 51

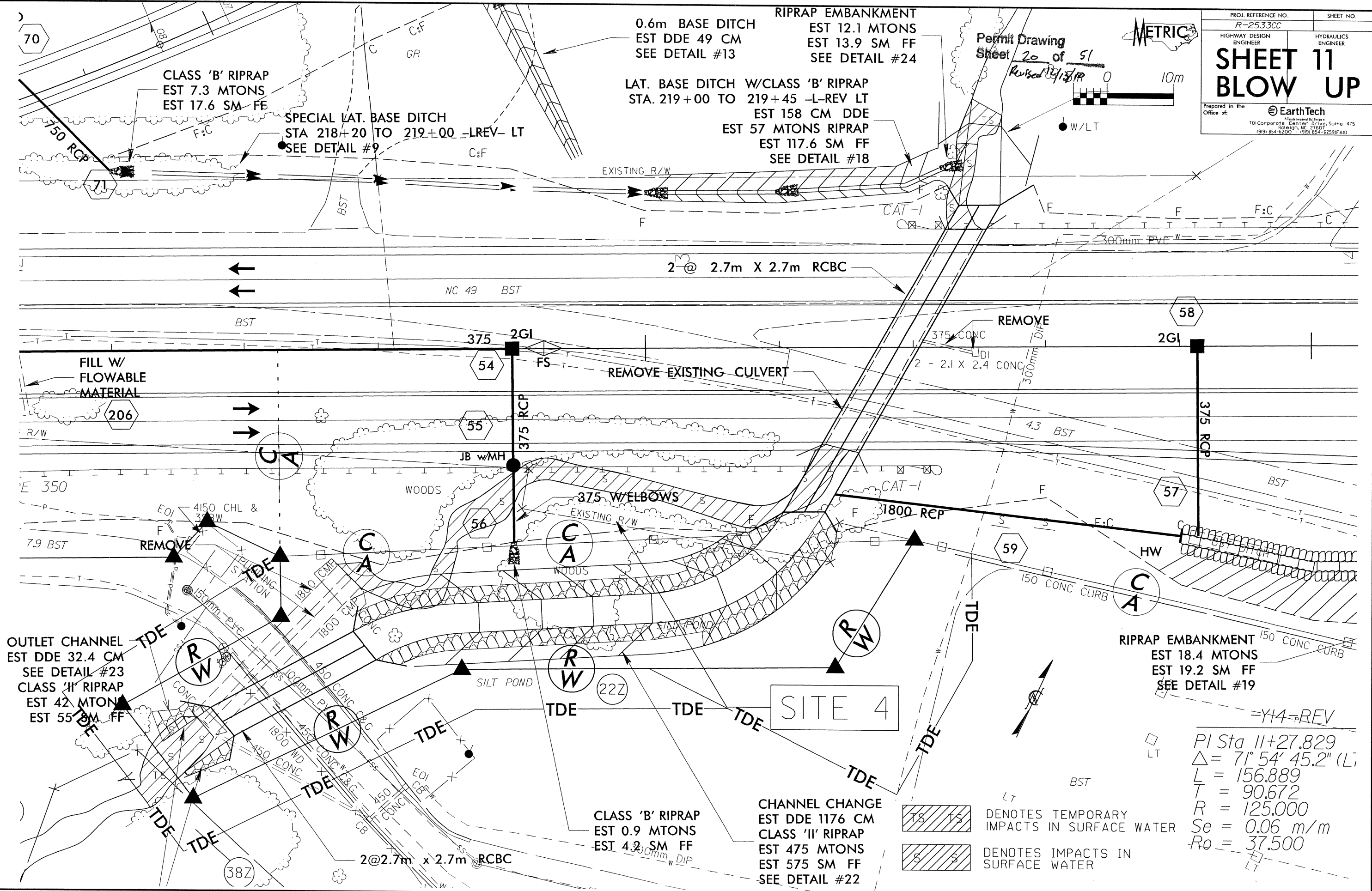
Revised 12/15/18

10m

W/LT

EarthTech

701 Corporate Center Drive, Suite 475  
Raleigh, NC 27607  
(919) 854-5200 • (919) 854-5259 (FAX)



RIPRAP EMBANKMENT  
EST 18.4 MTONS  
EST 19.2 SM FF  
SEE DETAIL #19

PI Sta 11+27.829  
 $\Delta = 71^\circ 54' 45.2''$  (L)  
 $L = 156.889$   
 $T = 90.672$   
 $R = 125.000$   
 $Se = 0.06 \text{ m/m}$   
 $R_0 = 37.500$

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

S S DENOTES IMPACTS IN SURFACE WATER

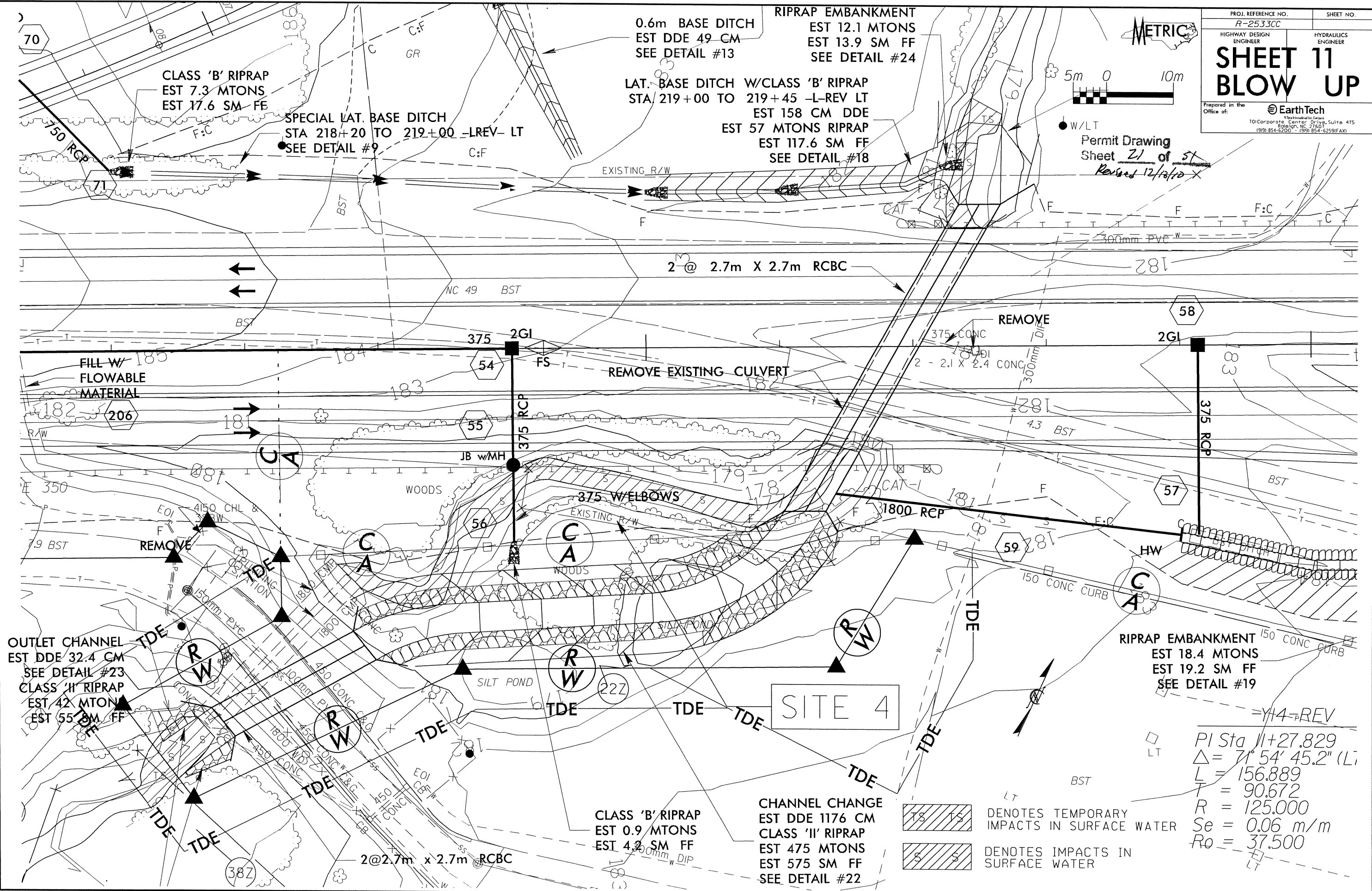
OUTLET CHANNEL  
EST DDE 32.4 CM  
SEE DETAIL #23  
CLASS 'H' RIPRAP  
EST 42 MTONS  
EST 55 SM FF

CHANNEL CHANGE  
EST DDE 1176 CM  
CLASS 'H' RIPRAP  
EST 475 MTONS  
EST 575 SM FF  
SEE DETAIL #22

USER: SAUSEN\*\*  
 DATE: 08/28/18  
 FILE: 082818\*\*



W/LT  
 Permit Drawing  
 Sheet 21 of 51  
 Revised 12/18/10



CLASS 'B' RIPRAP  
 EST 7.3 MTONS  
 EST 17.6 SM FF

SPECIAL LAT. BASE DITCH  
 STA 218+20 TO 219+00 -LREV- LT  
 SEE DETAIL #9

0.6m BASE DITCH  
 EST DDE 49 CM  
 SEE DETAIL #13

RIPRAP EMBANKMENT  
 EST 12.1 MTONS  
 EST 13.9 SM FF  
 SEE DETAIL #24

LAT. BASE DITCH W/CLASS 'B' RIPRAP  
 STA 219+00 TO 219+45 -L-REV LT  
 EST 158 CM DDE  
 EST 57 MTONS RIPRAP  
 EST 117.6 SM FF  
 SEE DETAIL #18

2 @ 2.7m X 2.7m RCBC

REMOVE

REMOVE EXISTING CULVERT

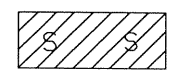
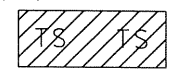
FILL W/  
 FLOWABLE  
 MATERIAL

OUTLET CHANNEL  
 EST DDE 32.4 CM  
 SEE DETAIL #23  
 CLASS 'II' RIPRAP  
 EST 42 MTONS  
 EST 55.8 SM FF

RIPRAP EMBANKMENT  
 EST 18.4 MTONS  
 EST 19.2 SM FF  
 SEE DETAIL #19

CLASS 'B' RIPRAP  
 EST 0.9 MTONS  
 EST 4.2 SM FF

CHANNEL CHANGE  
 EST DDE 1176 CM  
 CLASS 'II' RIPRAP  
 EST 475 MTONS  
 EST 575 SM FF  
 SEE DETAIL #22



DENOTES TEMPORARY  
 IMPACTS IN SURFACE WATER

DENOTES IMPACTS IN  
 SURFACE WATER

$\pi/4$ -REV  
 PI Sta 11+27.829  
 $\Delta = 71^\circ 54' 45.2''$  (L)  
 $L = 156.889$   
 $T = 90.672$   
 $R = 125.000$   
 $Se = 0.06$  m/m  
 $Ro = 37.500$

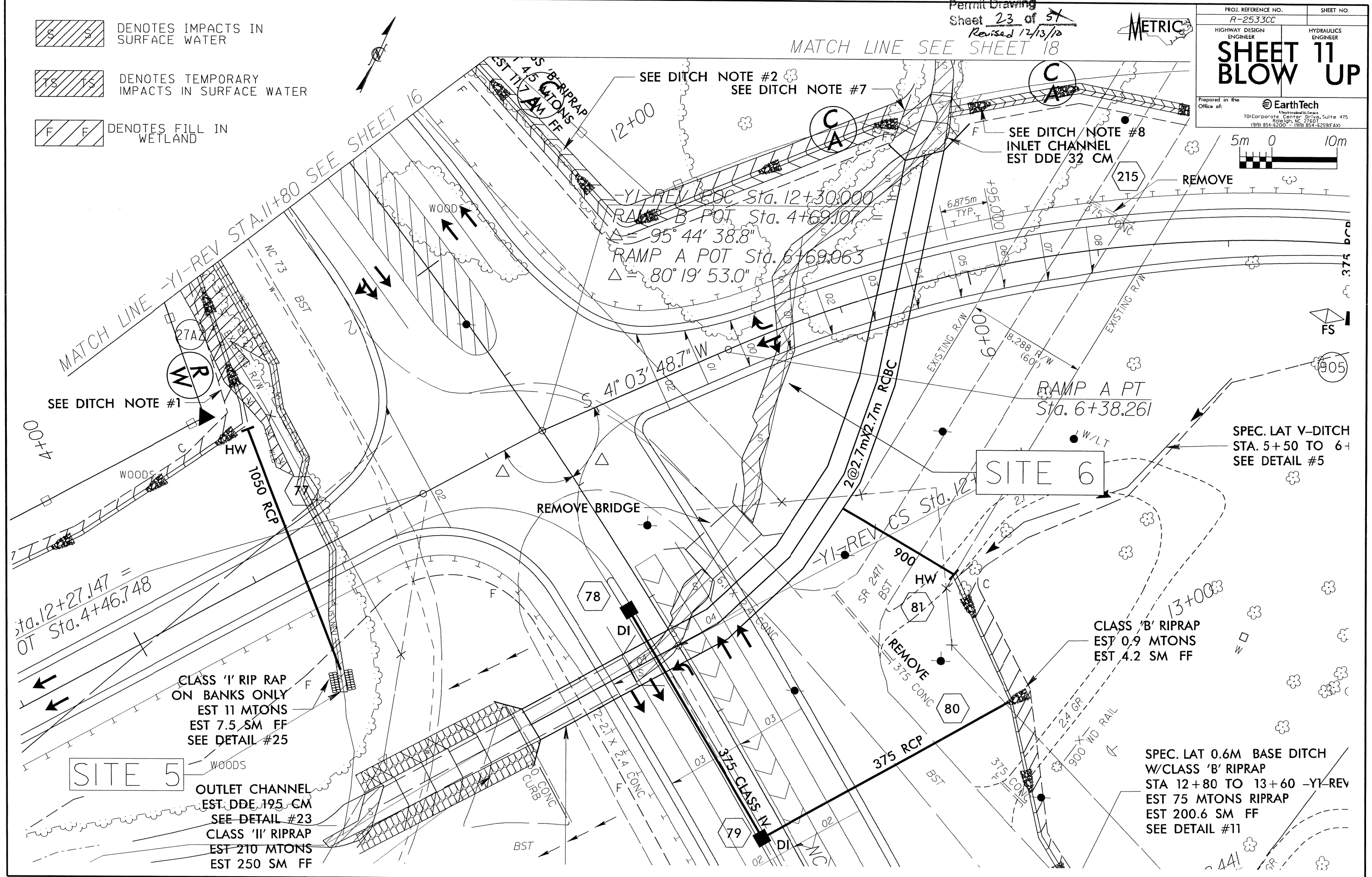
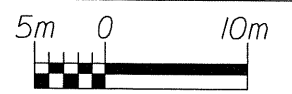
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 FILE: 081810



PROJ. REFERENCE NO. R-2533CC	SHEET NO.
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>SHEET 11</b>	
<b>BLOW UP</b>	
Prepared in the Office of: EarthTech <small>101 Corporate Center Drive, Suite 475      Raleigh, NC 27603      (919) 854-6200 • (919) 854-6259 (FAX)</small>	

- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- DENOTES FILL IN WETLAND

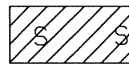
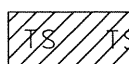
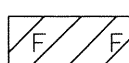
MATCH LINE SEE SHEET 18



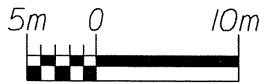
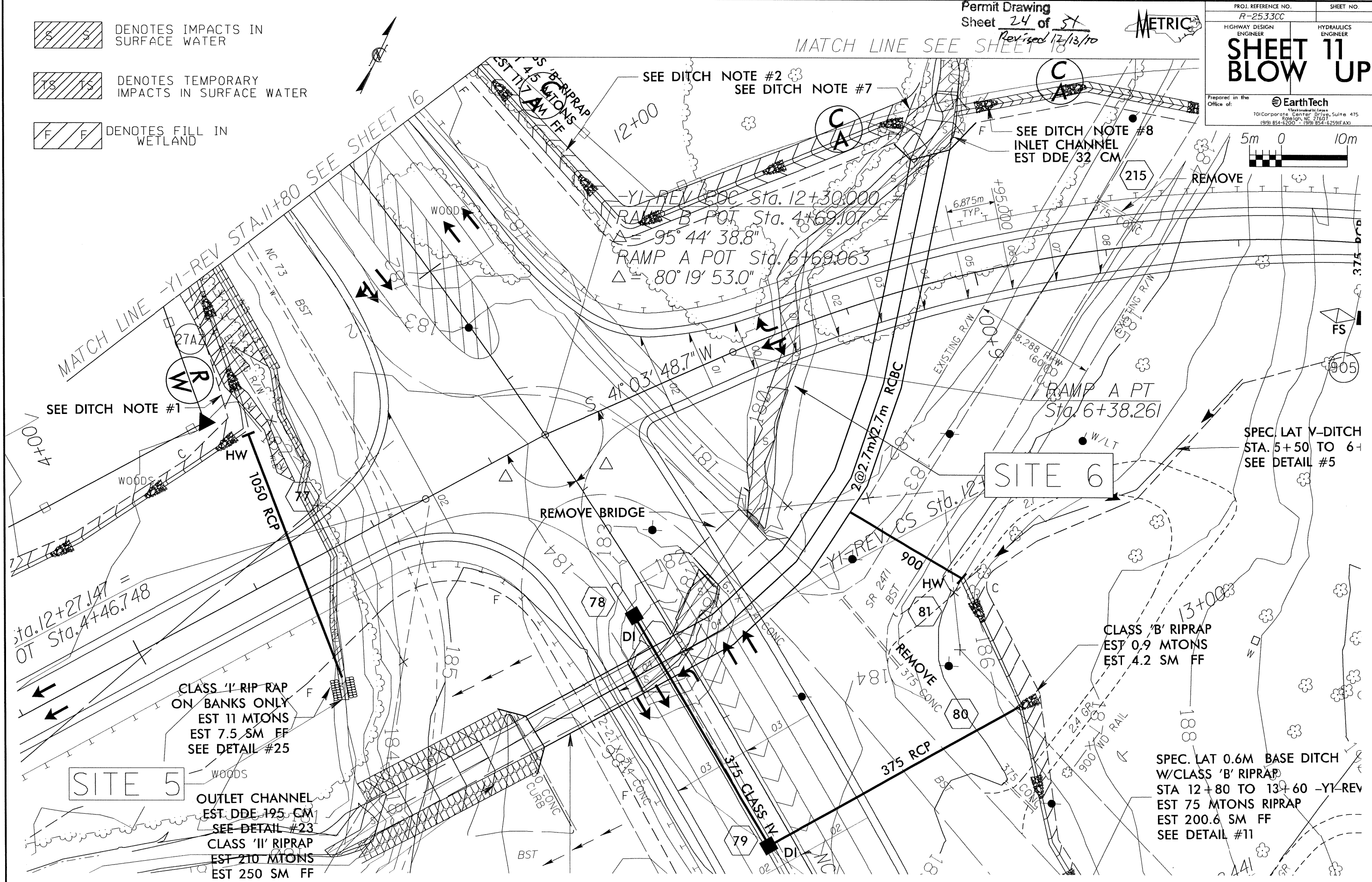
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 DATE: 12/13/12  
 PALE: 12/13/12



PROJ. REFERENCE NO. R-253300	SHEET NO.
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>SHEET 11 BLOW UP</b>	
Prepared in the Office of:	EarthTech
<small>Technical Support 101 Corporate Center Drive, Suite 475 Raleigh, NC 27607 (919) 854-6200 (919) 854-6291 (FAX)</small>	

-  DENOTES IMPACTS IN SURFACE WATER
-  DENOTES TEMPORARY IMPACTS IN SURFACE WATER
-  DENOTES FILL IN WETLAND

MATCH LINE SEE SHEET 18



SITE 5

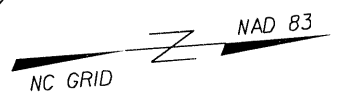
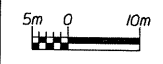
SITE 6

USER: #105283  
DATE: #02/25/11  
TIME: #11:51:58  
FILE: #RIPRAP



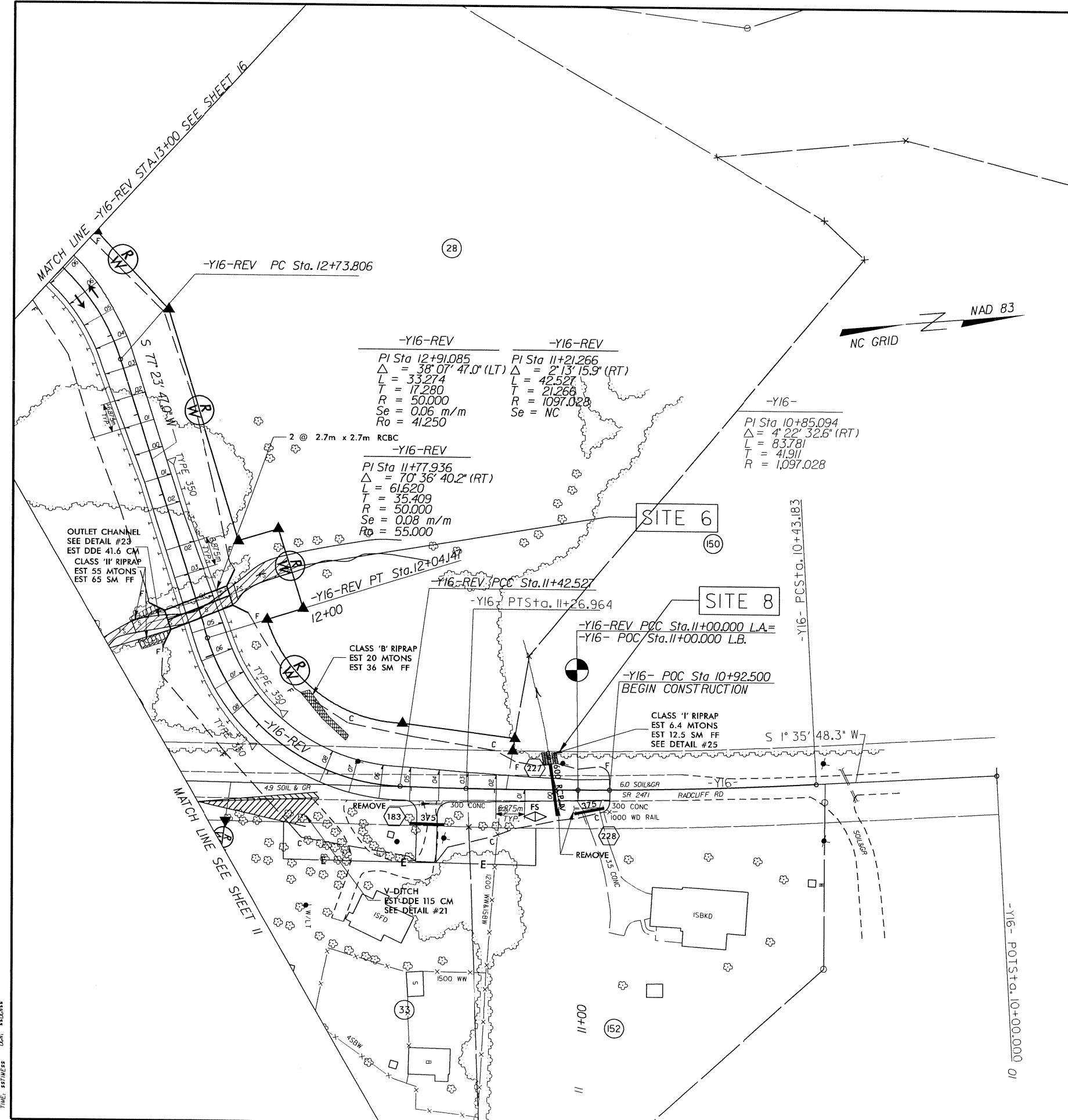
PROJ. REFERENCE NO. <b>R-2533CC</b>	SHEET NO. <b>18</b>
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
Prepared in the Office of: <b>AECOM</b> NC FIRM LICENSE No. F-0342 101 Corporate Center Drive, Suite 475 Raleigh, NC 27601 (919) 854-6200 • (919) 854-6259(FAX)	

Permit Drawing  
Sheet 35 of 51



DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER



FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-4

FOR -Y16-REV PROFILE, SEE SHEET 32  
FOR DITCH DETAILS, SEE SHEET 2-J

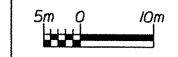
NOTE: ALL DRIVEWAY RADII ARE 3.0m UNLESS OTHERWISE SHOWN.

DATE: 08/15/05  
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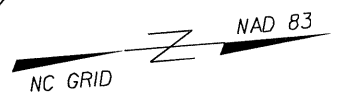


PROJ. REFERENCE NO. <b>R-2533CC</b>	SHEET NO. <b>18</b>
HIGHWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
<b>PRELIMINARY PLANS</b> DO NOT USE FOR CONSTRUCTION	
Prepared in the Office of: <b>AECOM</b>	
<small>NC FIRM LICENSE No. F-0342 701 Corporate Center Drive, Suite 475 Raleigh, NC 27607 (919) 854-6200 • (919) 854-6259(FAX)</small>	

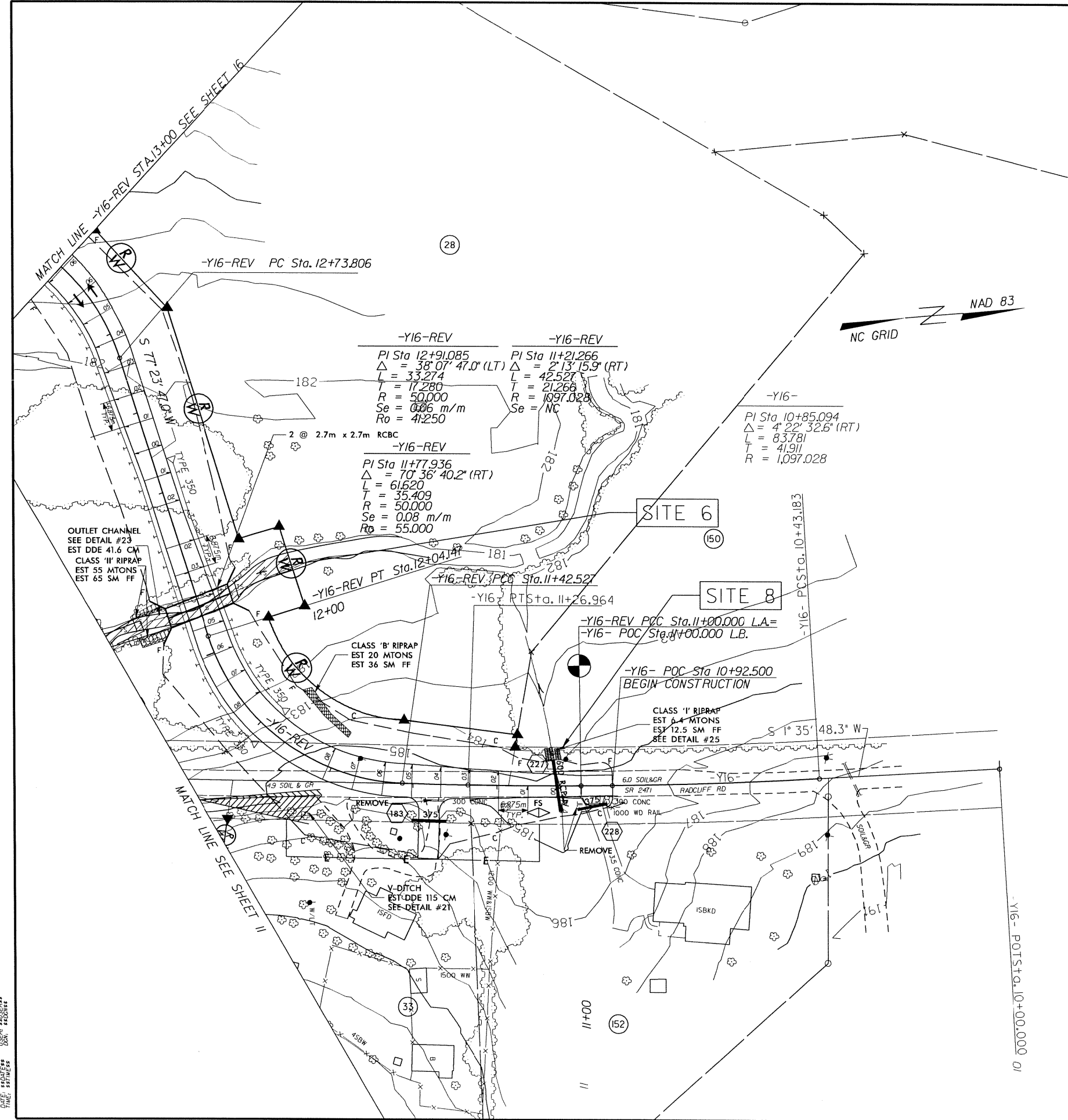
Permit Drawing  
Sheet 36 of 51



CONST. REV.  
R/W REV.



- DENOTES IMPACTS IN SURFACE WATER
- DENOTES TEMPORARY IMPACTS IN SURFACE WATER



FOR CULVERT PLANS, SEE SHEETS C-1 THRU C-10

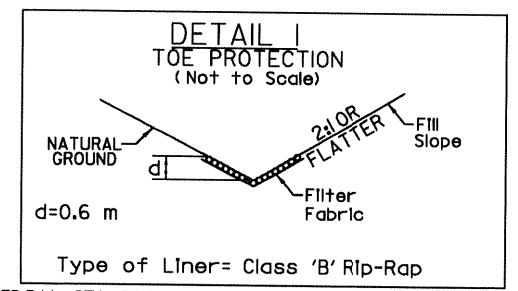
FOR -Y16-REV PROFILE, SEE SHEET 32  
FOR DITCH DETAILS, SEE SHEET 2-J

NOTE: ALL DRIVEWAY RADII ARE 3.0m UNLESS OTHERWISE SHOWN.

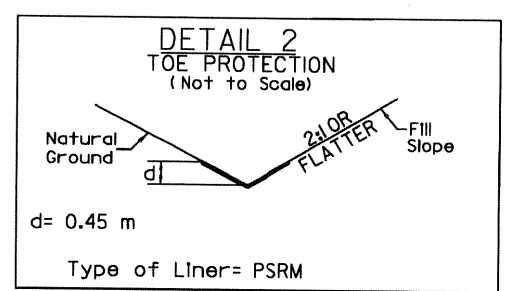
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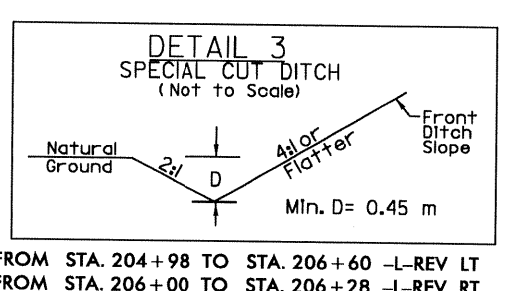
Revised 12/13/10



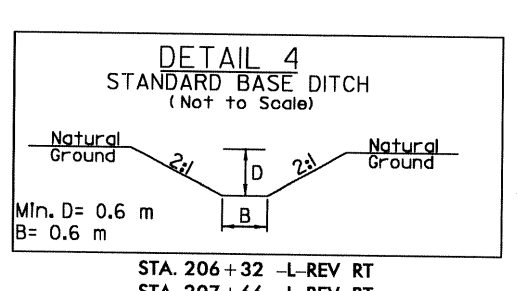
FROM STA. 200+80 TO STA. 202+40 -L-REV LT  
FROM STA. 233+30 TO STA. 234+30 -L-REV LT



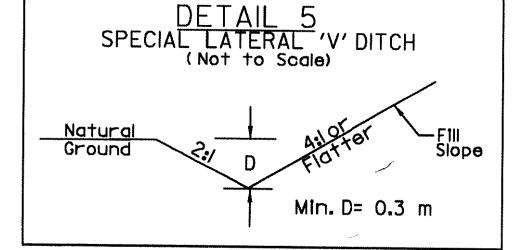
FROM STA. 202+40 TO STA. 202+60 -L-REV LT  
FROM STA. 204+25 TO STA. 204+80 -L-REV LT



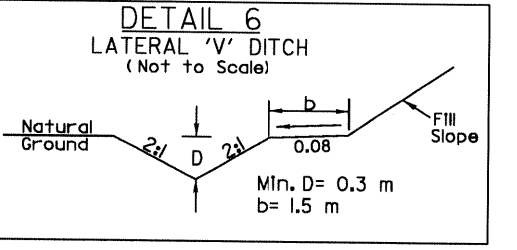
FROM STA. 204+98 TO STA. 206+60 -L-REV LT  
FROM STA. 206+00 TO STA. 206+28 -L-REV RT  
FROM STA. 206+80 TO STA. 207+81 -L-REV LT  
FROM STA. 9+85 TO STA. 10+72 -SER1- LT



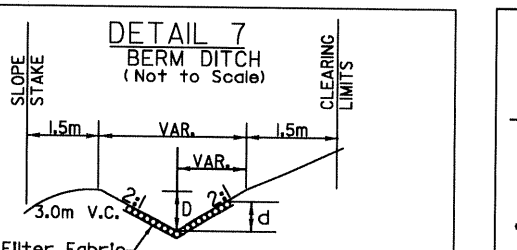
STA. 206+32 -L-REV RT  
STA. 207+66 -L-REV RT



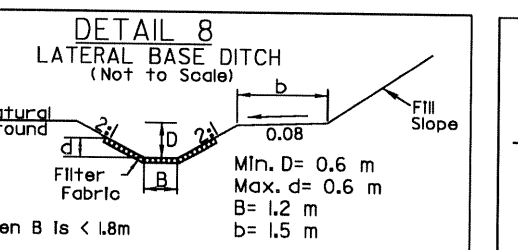
FROM STA. 208+40 TO STA. 208+80 -L-REV LT  
FROM STA. 228+60 TO STA. 229+40 -L-REV LT  
FROM STA. 16+40 TO STA. 17+00 -Y1-REV RT  
FROM STA. 5+50 TO STA. 6+16 RAMP A LT  
FROM STA. 0+45 TO STA. 1+20 LOOP D RT



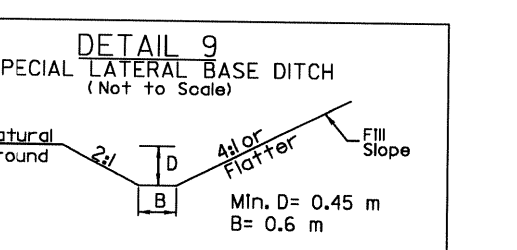
FROM STA. 208+80 TO STA. 210+80 -L-REV LT  
FROM STA. 228+13 TO STA. 228+60 -L-REV LT  
FROM STA. 11+19 TO STA. 11+40 -SER1- LT



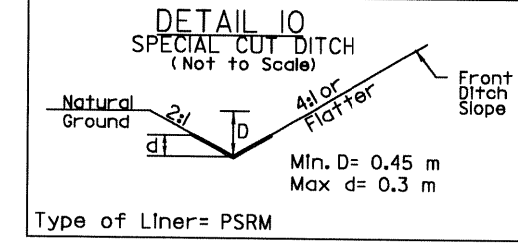
FROM STA. 211+60 TO STA. 211+95 -L-REV RT  
FROM STA. 3+40 TO STA. 3+60 RAMP B LT



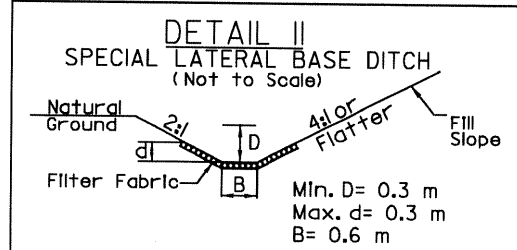
Type of Liner= Class 'B' Rip-Rap  
FROM STA. 212+20 TO STA. 213+00 -L-REV LT



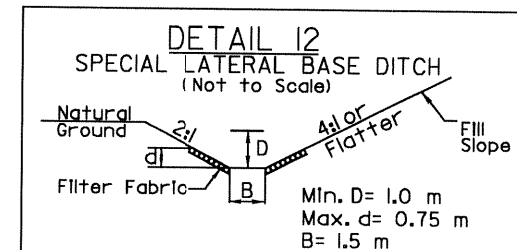
FROM STA. 213+00 TO STA. 214+00 -L-REV LT  
FROM STA. 218+20 TO STA. 219+00 -L-REV LT



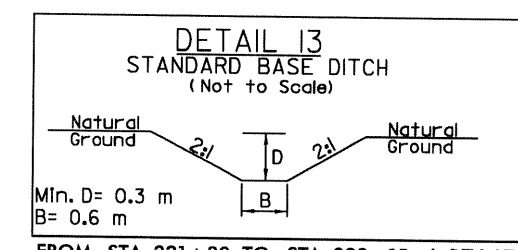
FROM STA. 212+20 TO STA. 212+40 -L-REV RT  
FROM STA. 214+00 TO STA. 214+60 -L-REV LT  
FROM STA. 16+53 TO STA. 18+00 -Y1-REV LT  
FROM STA. 10+05 TO STA. 10+86 -Y14-REV RT  
FROM STA. 11+40 TO STA. 11+83 -Y15-REV LT  
FROM STA. 11+60 TO STA. 11+84 -Y15-REV RT



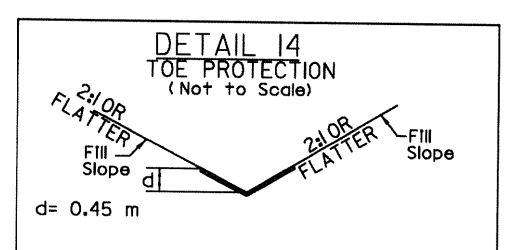
Type of Liner= Class 'B' Rip-Rap  
FROM STA. 11+20 TO STA. 12+03 -Y1-REV RT  
FROM STA. 12+80 TO STA. 13+60 -Y1-REV LT  
FROM STA. 3+60 TO STA. 4+30 -RAMP B- LT



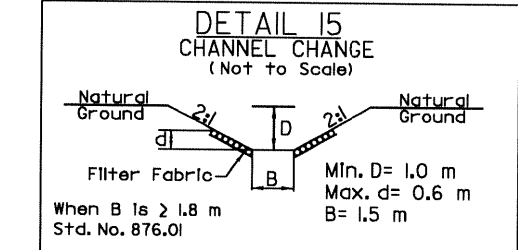
Type of Liner= Class 'I' Rip-Rap  
FROM STA. 219+80 TO STA. 221+00 -L-REV RT



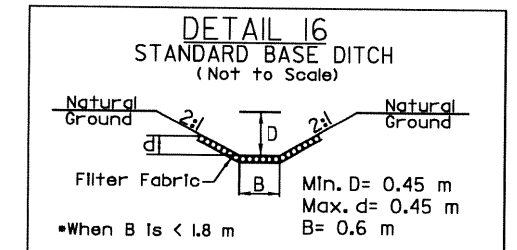
FROM STA. 221+80 TO STA. 222+15 -L-REV LT  
FROM STA. 222+74 TO STA. 222+85 -L-REV LT  
STA. 3+40 RAMP A LT  
STA. 2+40 RAMP B RT  
STA. 12+07 -Y14- LT



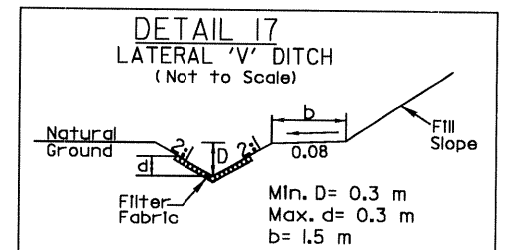
Type of Liner= PSRM  
FROM STA. 1+40 TO STA. 1+80 -LOOP D- LT



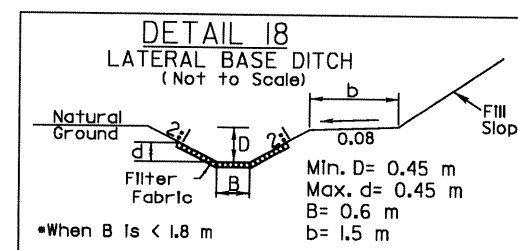
Type of Liner= Class 'I' Rip-Rap  
FROM STA. 200+38 TO STA. 200+48 -L-REV LT  
FROM STA. 223+36 TO STA. 224+07 -L-REV RT



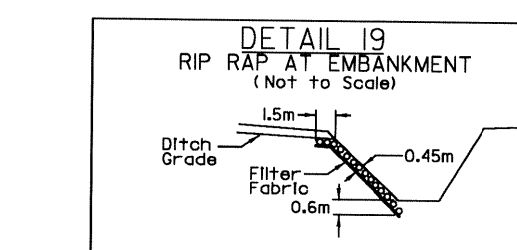
Type of Liner= Class 'B' Rip-Rap  
STA. 224+00 -L-REV RT  
STA. 18+50 -Y1-REV RT  
STA. 18+60 -Y1-REV LT



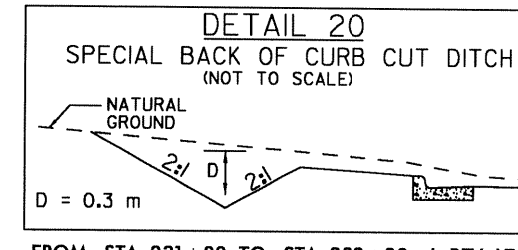
Type of Liner= Class 'B' Rip-Rap  
FROM STA. 5+64 TO STA. 5+96 RAMP A RT



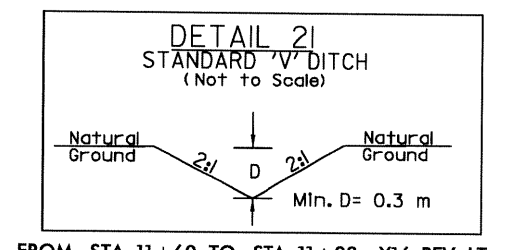
Type of Liner= Class 'B' Rip-Rap  
FROM STA. 210+80 TO STA. 212+10 -L-REV LT  
FROM STA. 219+00 TO STA. 219+45 -L-REV LT  
FROM STA. 233+71 TO STA. 233+97 -L-REV RT  
FROM STA. 11+55 TO STA. 12+10 -Y1-REV LT  
FROM STA. 6+03 TO STA. 6+45 -RAMP A- RT



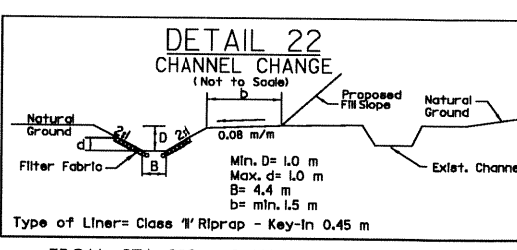
Type of Liner= 18.4 MTONS, Class 'B' Rip-Rap  
Filter Fabric= 19.2 sm  
STA. 220+20 -L-REV RT



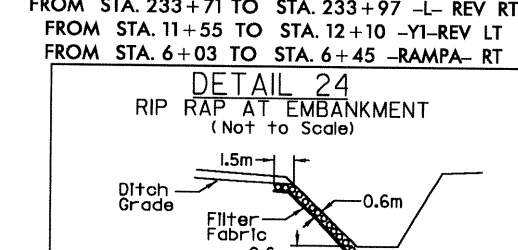
FROM STA. 231+80 TO STA. 232+20 -L-REV LT  
FROM STA. 232+30 TO STA. 232+50 -L-REV LT  
FROM STA. 232+60 TO STA. 233+04 -L-REV LT



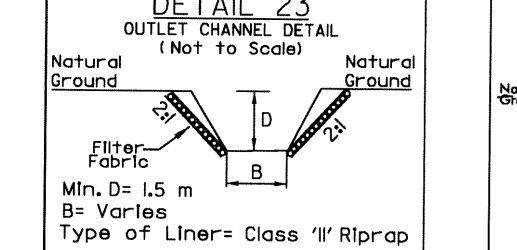
FROM STA. 11+60 TO STA. 11+80 -Y16-REV LT  
STA. 11+00 -Y2-REV RT



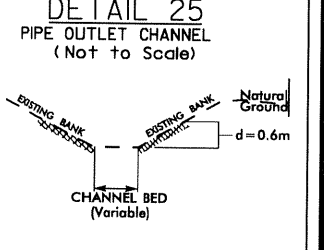
Type of Liner= Class 'I' Riprap - Key-In 0.45 m  
FROM STA. 218+58 TO STA. 219+20 -L-REV RT



Type of Liner= 12.1MTONS, Class 'I' Rip-Rap  
Filter Fabric= 13.9 sm  
STA. 212+10 -L-REV LT  
STA. 219+45 -L-REV LT



Type of Liner= Class 'I' Riprap  
FROM STA. 218+25 TO STA. 218+38 -L-REV RT  
STA. 12+68 -Y1-REV RT  
STA. 12+12 -Y16-REV LT



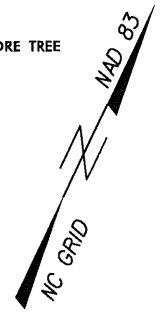
Class 'I' Rip-Rap  
STA. 11+07 -Y16-REV RT LENGTH= 3.0m  
STA. 4+25 -RPB- RT LENGTH= 5.0m

DATE: 10/21/10  
USER: r1000000  
TIME: 15:05 PM  
JOB: R-2533CC-01-02.dgn



Revised 12/13/10

BM 113 EL=182.406, N 183847 E 475753  
LI STA 199+91.40 LT  
RR SPIKE IN BASE OF 375MM TWIN SYCAMORE TREE



BEGIN T.J.P. PROJECT R-2533CC  
-L-REV POT Sta 200+16.400 LA=  
-LI- POT Sta 200+17.273 LB.(R-2533B)

BEGIN GRADE  
-LI- POT Sta 199+95.000 (R-2533B)

BL-1302 -BL- PINC 9+60.070 =  
-LI- Sta 199+93.942 (17.588 LT)  
EL 184.287

-LREV-  
+50.000  
28.714 & 35.000  
(94.214' & 114.829')

1  
NED C. REECE  
DB 496 PG 151  
DB 794 PG 162

+95.00 -LI-  
END 40mm OVERLAY  
OF EXISTING PAVEMENT  
NBL & SBL

+33.453 -LI-  
TIE TO EXISTING GUARDRAIL

-LREV-  
+40.000  
25.657 & 30.500  
(84.175' & 100.066')

CLASS 'II' BOULDERS  
EST 4.1 MTONS  
EST 22 SM COIR FIBER MATTING  
SEE DETAIL SHEET 2-Y  
1.5m BASE CHANNEL CHANGE  
W/CLASS 'I' RIPRAP ON BANKS ONLY  
EST 20 MTONS RIPRAP  
EST 34.5 SM FF  
EST DDE 22.5 CM  
SEE DETAIL #15

-LREV-  
+00.000  
30.500 & 35.000  
(100.065' & 114.829')

TOE PROTECTION  
STA. 200+80 TO 202+40 -L-REV LT  
SEE DETAIL #1  
EST 206 MTONS CLASS 'B' RIPRAP  
EST 346.1 SM FF

RESET FENCE  
-LREV- STA. 200+80 +/- TO  
-LREV- STA. 202+00 +/-

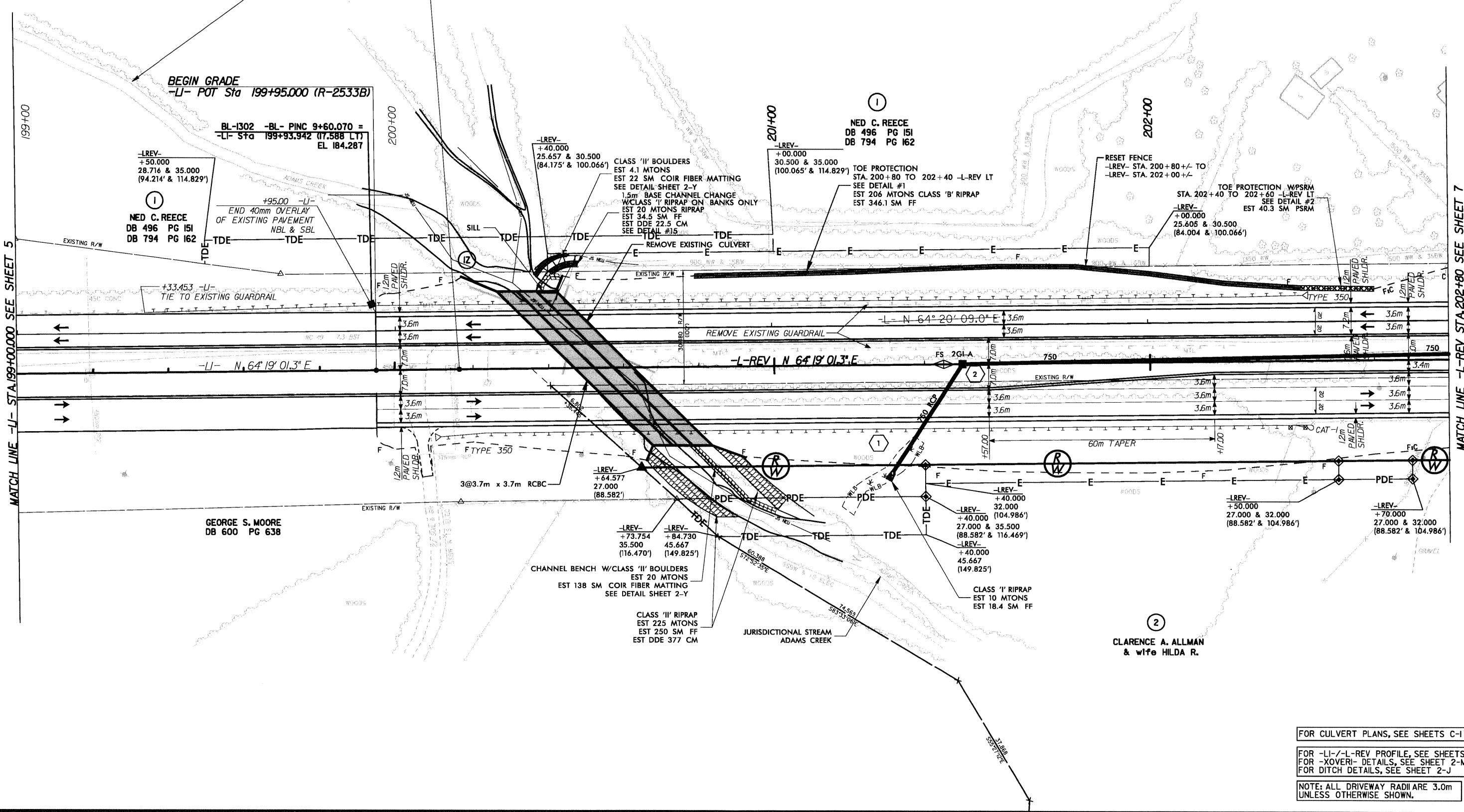
TOE PROTECTION W/PSRM  
STA. 202+40 TO 202+60 -L-REV LT  
SEE DETAIL #2  
EST 40.3 SM PSRM

-LREV-  
+00.000  
25.605 & 30.500  
(84.004' & 100.066')

1  
NED C. REECE  
DB 496 PG 151  
DB 794 PG 162

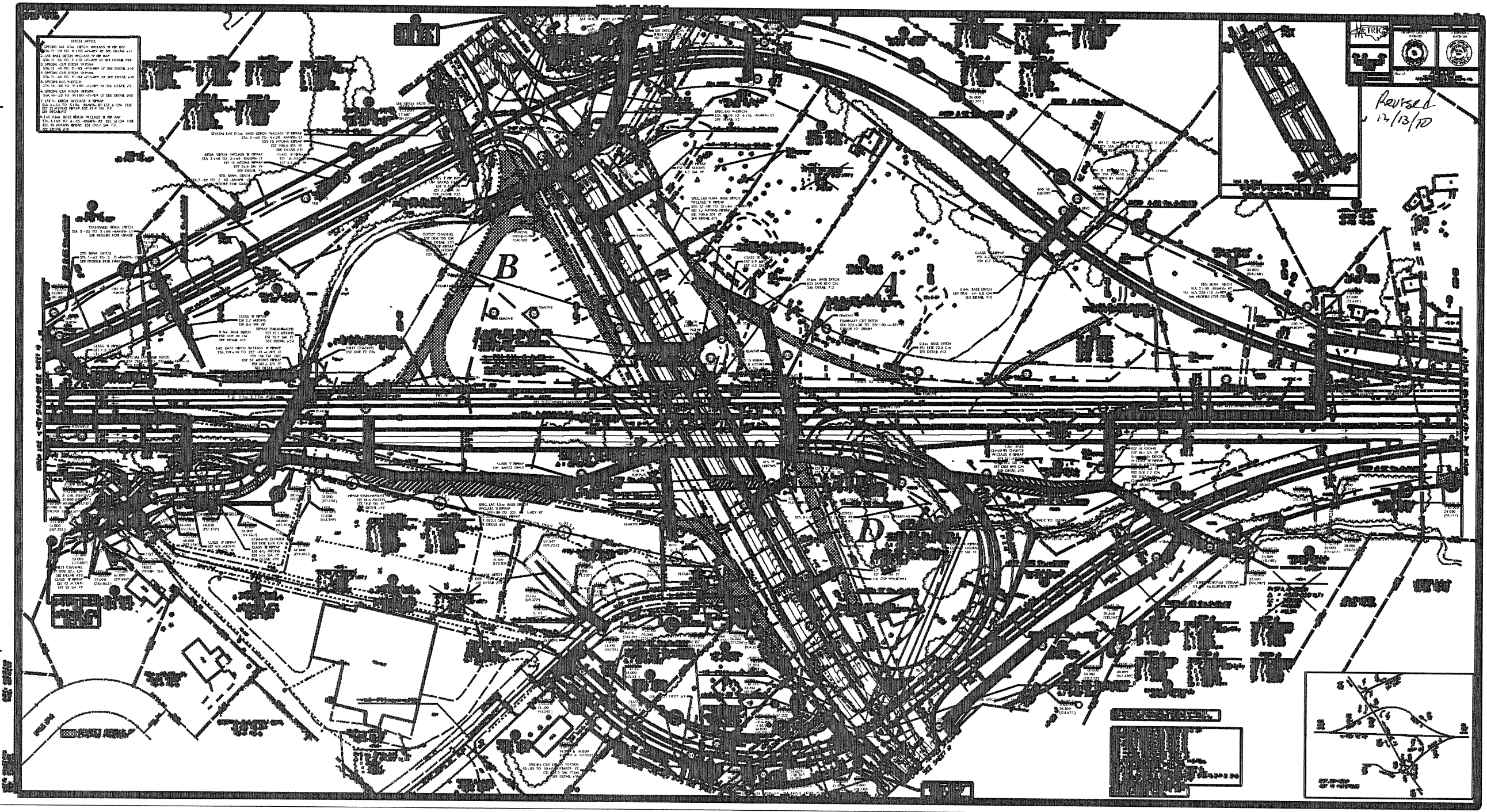
MATCH LINE -LI- STA 199+00.000 SEE SHEET 5

MATCH LINE -L-REV STA 202+80 SEE SHEET 7



DATE: 12/29/10  
TIME: 1:25 PM  
USER: r2533cc  
CADD: r2533cc

FOR CULVERT PLANS, SEE SHEETS C-I THRU C-I  
FOR -LI-/-L-REV PROFILE, SEE SHEETS 20 & 21  
FOR -XOVER- DETAILS, SEE SHEET 2-M  
FOR DITCH DETAILS, SEE SHEET 2-J  
NOTE: ALL DRIVEWAY RADII ARE 3.0m UNLESS OTHERWISE SHOWN.



SECTION A-A  
SECTION B-B  
SECTION C-C  
SECTION D-D  
SECTION E-E  
SECTION F-F  
SECTION G-G  
SECTION H-H  
SECTION I-I  
SECTION J-J  
SECTION K-K  
SECTION L-L  
SECTION M-M  
SECTION N-N  
SECTION O-O  
SECTION P-P  
SECTION Q-Q  
SECTION R-R  
SECTION S-S  
SECTION T-T  
SECTION U-U  
SECTION V-V  
SECTION W-W  
SECTION X-X  
SECTION Y-Y  
SECTION Z-Z



Revised  
12/13/10

NO.	DESCRIPTION	QTY
1	...	...
2	...	...
3	...	...
4	...	...
5	...	...
6	...	...
7	...	...
8	...	...
9	...	...
10	...	...

